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ABSTRACT

This packet contains a program guide and a career map for the implementation of a nursery operations program in Florida secondary and postsecondary schools. The program guide describes the program content and structure, provides a program description, lists job titles under the program, explains licensing, and includes a curriculum framework and student performance standards for ornamental horticulture and nursery operations courses. The curriculum framework outlines major concepts and content, laboratory activities, program specifics, and intended outcomes; the student performance standards guide lists each standard and the behaviors expected to show mastery of each standard. The guide also provides information on the following: facility design for the nursery operation program, equipment, program implementation, teacher professional development, and instructional resources (a listing of 80 print materials, 12 audiovisuals, 2 computer software programs, and 44 sources of instructional materials). Appended to the program guide is a sample student learning guide that includes program title, course title, intended outcomes, activity, introduction, objectives, performance objective, tasks, references, tools and equipment, procedures, information sheets, laboratory sheets, self-check and answers, activity sheet, written test, and a performance test. The Career Merit Achievement Plan (Career MAP) is a checklist of student progress in the competencies required for entry into the field of nursery operations, to be kept by student and teacher. (KC)

ED357155

FLORIDA VOCATIONAL PROGRAM GUIDE FOR

NURSERY OPERATIONS

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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Florida Department of Education
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FLORIDA VOCATIONAL PROGRAM GUIDE FOR

NURSERY OPERATIONS

State of Florida
Department of Education
Tallahassee, Florida
Betty Castor, Commissioner
Affirmative action/equal opportunity employer

Division of Vocational, Adult, and Community Education
Bureau of Vocational Program and Staff Development

April 1989

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INTRODUCTION

The Florida Vocational Program Implementation Guide can be applied to all vocational programs in Florida. This program guide, however, was developed specifically for the Nursery Operations program to provide information that will be useful to local school-district and community-college administrators, faculty and instructors, program advisory committee members, regional coordinating councils, regional criminal justice training centers, and others charged with the responsibility of offering vocational education programs. The final planning and evaluation of any educational program, however, must be done within the context of local conditions. This publication will serve to identify the major concerns that should be considered in the organization, operation, and evaluation of a vocational education program.

Vocational education has evolved to meet the needs of students desiring to pursue selected careers or vocations. In general, vocational education is designed to provide programs, services, and activities that are realistic in light of present and future employment opportunities. In recent years, applications of science and technology have expanded rapidly, increasing the education and training required of personnel. The new technologies require many additional technical supportive staff to carry out both standardized and specialized procedures.

Today, vocational education is an increasingly viable option for students. The Florida Department of Education (DOE) shares with business, government, and industry the determination to provide opportunities for upward mobility to as many Floridians as possible. For this to become a reality, exemplary career educational programs must be created and these programs must be consistent throughout the state.

State Board of Education Administrative Rule 6A-10.24: Articulation between universities, community colleges, and school districts outlines steps and guidelines that will bring about a systematic interrelationship among Florida institutions offering similar or related courses and programs. The rule states, in part, that

> when a student transfers among postsecondary vocational-technical centers, community colleges, and universities, the receiving institution shall award credit for courses satisfactorily completed at the previous institutions when the courses are judged to be equivalent to courses offered at the receiving institution.

This program guide helps ensure that equivalency. Throughout Florida, vocational programs, if implemented according to the criteria described in this document, will help many citizens fill an important place in our state and national work force.

PROGRAM CONTENT AND STRUCTURE

The content of the Nursery Operations program is based on occupational competencies and employability skills required on the job in Nursery Operations and Nursery Technology. The basic content of these programs is described in the Florida Curriculum Framework and Student Performance Standards (SPSs). To meet the local needs of the work force, the SPSs may be modified by local education agencies.

Students enrolled in this program should be able to benefit from the instructional content with reasonable expectations for entry-level employment upon successful completion of the program.

This section includes a program description and job titles in Nursery Operations occupations, information on licensure and credentialing, program structure in relation to other programs in the horticulture area, and the Curriculum Framework and Student Performance Standards for Nursery Operations.

Program Description

Agribusiness and Natural Resources Education (ANRE) is a group of planned, specialized instructional programs structured to enable students to begin and to refine prescribed competencies required for employment in a cluster of Agribusiness and Natural Resources occupations.

The Nursery Operations program in ANRE includes learning experiences, both classroom and practical, that are concerned with providing students with an initial exposure to the skills and attitudes associated with a career in Nursery Operations.

The skills and attitudes that are basically related to producing, processing, and marketing plants, shrubs, and trees used principally for ornamental, recreational, aesthetic, and functional purposes are indicated as intended outcomes in the Curriculum Framework of this guide.

Job Titles

Job titles for Nursery Operations occupations are as follows:

Horticultural Worker II (405.687-014)
Horticultural-Specialty Growers, Field (405.161-014)
Horticultural-Specialty Growers, Inside (405.161-018)
Field Inspector for Disease and Insect Control (408.687-010)
Chemical Applicator
Nursery Salesperson
Nursery Worker
Agricultural Equipment Operator
Tree Trimmer
Tree Grower

Licensure and Credentialing

The jobs listed above do not require special licensure or certification, and advancement to supervisor and to manager within an occupation depends on experience, aptitude, attitude, and training.

However, students who have completed the Nursery Operations program can be certified as nursery professionals by passing the certifying examination offered by the Florida Nursery Growers Association (FNGA) or can be licensed as restricted pesticide applicators by passing examinations administered by the Cooperative Extension Service through the Florida Department of Agriculture and Consumer Services.

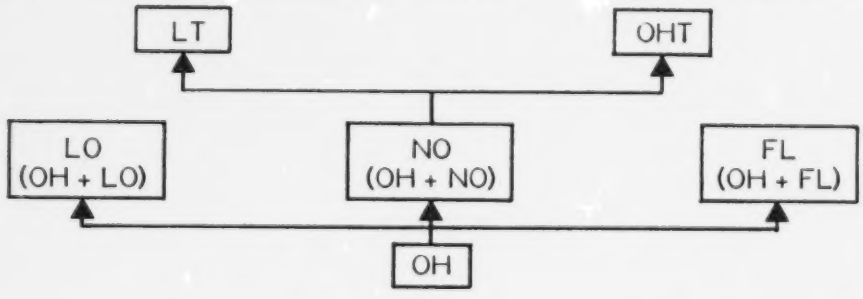
Program Structure

The cluster of horticulture programs consists of Ornamental Horticulture (OH), Floriculture (FL), Nursery Operations (NO), Landscape Operations (LO), Landscape Technology (LT), and Ornamental Horticulture Technology (OHT). These programs include content that is common to all of them. This common content makes up the Ornamental Horticulture program, which is a 3-credit program at the secondary level and a 450-hour program at the postsecondary adult level. It is a job preparatory program as well as a preparatory program for the other horticulture-related programs.

The Nursery Operations program consists of the Ornamental Horticulture program and a three-credit (or 450-hour) Nursery Operations course; the Landscape Operations program consists of the Ornamental Horticulture program and a three-credit (or 450-hour) Landscape Operations course; and the Floriculture program is made up of the Ornamental Horticulture program and a three-credit (or 450-hour) Floriculture course. Therefore, those students who have completed the Ornamental Horticulture program and then enrolled in any of the three related programs (Nursery Operations, Landscape Operations, or Floriculture) can skip the first half of the program and study only the program-specific second half. Those students who have completed any one of these three programs and then enrolled in one of the other two programs can skip the first half of the program also.

(Associate degree programs in Landscape Technology and Ornamental Horticulture Technology are offered at community colleges.)

A relationship among these horticulture-related programs is depicted as follows:



Test Item Bank

A bank of multiple-choice test items was developed to measure students' achievement on the Student Performance Standards (SPSs) of the Nursery Operations program. These items are based on the 1988 version of the SPSs. Since the SPSs were updated in 1989, you must check the test items you want to use for your program to make sure that they match the current SPSs. For information on how to obtain these test items, contact the Occupational Program Director (904/488-0482) or the program specialist for your region.

Curriculum Framework and Student Performance Standards

The Curriculum Framework and Student Performance Standards provided on the following pages are for the Nursery Operations program. The standards are suggested but not required. It is strongly recommended that you and your program advisory committee review and revise them to meet your community's work force needs.

If you revise the SPSs listed both in the Vocational Education Program Courses Standards and on the following pages, you must also change them in the Nursery Operations Career MAP so that the SPSs and the standards in the MAP match each other.

The Curriculum Framework--effective July, 1989--which appears on the following pages, indicates that a student takes Nursery Operations courses 1-6. However, this will change in 1990, when the program will consist of the following:

8121310 Ornamental Horticulture 1
8121320 Ornamental Horticulture 2
8121330 Ornamental Horticulture 3
8121210 Nursery Operations 1
8121220 Nursery Operations 2
8121230 Nursery Operations 3

CURRICULUM FRAMEWORK
FLORIDA DEPARTMENT OF EDUCATION

PROGRAM AREA: Agriculture
EFFECTIVE DATE: July, 1989

PROGRAM TITLE: Nursery Operations

CODE NUMBER: Secondary 8121200 Postsecondary ORV0310
Florida CIP AG01.060600

SECONDARY SCHOOL CREDITS: 6 COLLEGE CREDITS: x
POSTSECONDARY ADULT VOCATIONAL CREDITS: ____

APPLICABLE LEVELS: ___ 7-9 ___ 9-12 x Other 10-12, 30, 31
___ Postsecondary Adult Vocational ___ Postsecondary Vocational

CERTIFICATION COVERAGE: 10-12, 31 VOC AGRI 4
AGRI 4
HORTICULT 7

30 VOC AGRI 4
AGRI 2, 4
HORTICULT 7

1. **Major Concepts/Content.** The purpose of this program is to prepare students for employment as horticultural-specialty growers, field (405.161-014); horticultural-specialty growers, inside (405.161-018); supervisors; horticultural-specialty farmers (405.131-010); field inspectors, disease and insect control (408.687-010); horticultural workers II (405.687-014); or to provide supplemental training for persons previously or currently employed in these occupations.

   The content includes, but is not limited to, instruction that prepares individuals to produce, process, and market plants, shrubs, and trees used principally for ornamental, recreational, and aesthetic purposes. Subject matter also includes fertilization, irrigation, harvesting and marketing, mechanics, facility maintenance, pest control, plant identification, as well as leadership, communication, employability, and human relations skills.

   Listed below are the courses that comprise this program when offered at the secondary level:

   8121210 Nursery Operations 1
   8121220 Nursery Operations 2
   8121230 Nursery Operations 3
   8121240 Nursery Operations 4
   8121250 Nursery Operations 5
   8121260 Nursery Operations 6

II. **Laboratory Activities.** Agricultural shop and plant nursery laboratory activities are an integral part of this program including the safe use of mechanics' hand tools, field hand tools, carpentry hand and portable power tools, arc welders, oxyacetylene torches, tractors and field equipment, chemical applicators, power sprayers, and irrigation equipment.

III. **Special Note.** Future Farmers of America (secondary) and the National Postsecondary Agricultural Student Organization (postsecondary) are the appropriate vocational student organizations for providing leadership training and for reinforcing specific vocational skills. When provided, these activities are considered an integral part of this instructional program.

Planned and supervised occupational activities must be provided through one or more of the following: (1) directed laboratory experience, (2) student projects, (3) placement for experience, (4) cooperative experience.

Because of the production and marketing cycle of the ornamental horticultural industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

The cooperative method of instruction is appropriate for this program. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

In accordance with Section 233.0695 F.S., the minimum basic skills grade level required for this postsecondary adult vocational program is: Mathematics 6.0, Language 7.0. This grade level number corresponds to a grade equivalent score obtained on a state-designated basic skills examination.

The typical length of this program for the average achieving student is 900 hours.

The particular outcomes and student performance standards which the handicapped student must master to earn credit must be specified in the student's individual educational plan (IEP). Additional credits may be earned when outcomes and standards are mastered in accordance with the requirements indicated in subsequent IEP's. The job title for which the student is being trained must be designated in the IEP.

IV. **Intended Outcomes.** After successfully completing this program, the student will be able to:

01. Demonstrate an understanding of the horticulture industry.
02. Describe plant physiology and growth.
03. Identify and classify plants.
04. Propagate plants.
05. Identify growing media and apply fertilizers.
06. Irrigate plants and turfs.

07. Control pests.
08. Demonstrate pruning skills.
09. Harvest, transport, and install plant materials.
10. Operate, repair, and maintain tools and equipment.
11. Keep records.
12. Demonstrate employability skills.
13. Demonstrate leadership, communications, and human relations skills.
14. Prepare growing media and seedbeds.
15. Propagate nursery stock.
16. Prune and shape nursery stock.
17. Irrigate plants.
18. Harvest, process, and ship nursery stock.
19. Market nursery stock.
20. Operate, repair, and maintain nursery equipment and facilities.
21. Fertilize nursery stock.
22. Control plant pests.
23. Maintain and analyze records.

STUDENT PERFORMANCE STANDARDS EFFECTIVE DATE: July, 1989

PROGRAM AREA: Agriculture SECONDARY NUMBER: 8121200

PROGRAM TITLE: Nursery Operations POSTSECONDARY NUMBER: ORV0310

01.0 DEMONSTRATE AN UNDERSTANDING OF THE HORTICULTURE INDUSTRY--The student will be able to:

- 01.01 Identify fields of endeavor.
- 01.02 Describe economic importance.
- 01.03 Describe environmental importance.
- 01.04 Identify employment opportunities.
- 01.05 Describe regulatory aspects.
- 01.06 Identify continuing education opportunities.
- 01.07 Identify professional organizations and trade journals in horticulture industry.

02.0 DESCRIBE PLANT PHYSIOLOGY AND GROWTH--The student will be able to:

- 02.01 Describe woody and herbaceous plants.
- 02.02 Identify parts of the plant.
- 02.03 Describe the process of photosynthesis.
- 02.04 Describe the basic functions of roots, stems, and leaves.
- 02.05 List the requirements for healthy plant growth.
- 02.06 Identify taproot and fibrous root systems.
- 02.07 Identify the difference between evergreen and deciduous plants.

03.0 IDENTIFY AND CLASSIFY PLANTS--The student will be able to:

- 03.01 Classify plants as monocots or dicots.
- 03.02 Identify plants according to scientific and common name.
- 03.03 Classify plants as annuals, biennials, and perennials.
- 03.04 Identify plants appropriate to a region.
- 03.05 List environmental preference of plants (shade, sun, wind, moisture, salt, etc.)
- 03.06 Classify plants according to growth habit.

04.0 PROPAGATE PLANTS--The student will be able to:

- 04.01 Identify asexual and sexual plant propagation methods.
- 04.02 Prepare propagation media.
- 04.03 Select and collect propagation materials.
- 04.04 Demonstrate propagation by seeding, grafting, budding, layering, separation, division, and cutting.
- 04.05 Demonstrate environmental controls for propagation materials (moisture, temperature, light).
- 04.06 Transplant rooted propagation materials.
- 04.07 Identify propagating and growing facilities and structures.

05.0 IDENTIFY GROWING MEDIA AND APPLY FERTILIZERS--The student will be able to:

05.01 Identify soil and media materials.
05.02 Identify types and kinds of fertilizer.
05.03 Identify methods of distributing fertilizers.
05.04 Interpret analysis of fertilizer from information on tag or container.
05.05 Identify symptoms of nutritional deficiencies of plants.
05.06 Collect a soil sample for soil analysis.
05.07 Determine fertilization requirements of plant materials.
05.08 Determine a fertilizer schedule.
05.09 Apply fertilizer and soil amendments.
05.10 Apply special fertilization methods appropriate to a region or plant group.
05.11 Determine rate of fertilizer applications.
05.12 Recognize symptoms of fertilizer burn.
05.13 Clean and store fertilizer application unit.
05.14 Maintain fertilization records.

06.0 IRRIGATE PLANTS AND TURFS--The student will be able to:

06.01 Identify water needs of plants.
06.02 Identify irrigations components and types of systems.
06.03 Identify sources of water for irrigation.
06.04 Install irrigation systems with control valves and clocks.
06.05 Install drainage system. Identify drainage components for different types of drainage systems.
06.06 Irrigate plants.
06.07 Repair irrigation systems.

07.0 CONTROL PESTS--The student will be able to:

07.01 Classify insects according to feeding habits.
07.02 Identify common insects and diseases of plants.
07.03 Describe life cycle of insect pests and diseases.
07.04 Describe methods (biological, chemical, and cultural) of controlling plant insects and diseases.
07.05 Report insect and disease damage.
07.06 Interpret information on a pesticide or agricultural chemical label.
07.07 Interpret and use spray compatibility chart.
07.08 Comply with local, state, federal, and EPA regulations regarding pesticide use.
07.09 Select, mix and apply pesticides according to the product label.
07.10 Clean, adjust, and calibrate spray equipment.
07.11 Store and dispose of pesticide containers legally.
07.12 Maintain pesticide records.
07.13 Describe symptoms of pesticide poisoning and identify first aid required.
07.14 Determine appropriate time to apply chemicals.
07.15 Select and identify pesticides according to controlling action (stomach, contact, systemic).

08.0 DEMONSTRATE PRUNING SKILLS--The student will be able to:

- 08.01 Identify methods of pruning plants to achieve desired growth and maintain health.
- 08.02 Identify and select pruning tools for the task.
- 08.03 Identify appropriate time to prune plants.
- 08.04 Root-prune appropriate plants.
- 08.05 Prune plants for desired shape and growth.
- 08.06 Identify and select chemical growth regulators.
- 08.07 Identify means of sterilizing pruning tools.

09.0 HARVEST, TRANSPORT, AND INSTALL PLANT MATERIALS--The student will be able to:

- 09.01 Select and prepare field grown and container plants for transportation and transplanting.
- 09.02 Determine requirements for preserving plant viability.
- 09.03 Install ornamental plants per a landscape plan.

10.0 OPERATE, REPAIR, AND MAINTAIN TOOLS AND EQUIPMENT--The student will be able to:

- 10.01 Identify, operate, and maintain small gasoline engines.
- 10.02 Identify, operate, and maintain hand tools and power tools.
- 10.03 Perform equipment pre-operational check before use.
- 10.04 Identify, operate, and maintain tractor and power equipment.
- 10.05 Load, secure, and transport equipment.
- 10.06 Demonstrate safety precautions while working with tools and equipment.
- 10.07 Maintain equipment maintenance and service records.

11.0 KEEP RECORDS--The student will be able to:

- 11.01 Keep fertilizer and pesticide application records.
- 11.02 Keep equipment maintenance and service records.
- 11.03 Keep job records, daily log sheets, and inventory.

12.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

- 12.01 Conduct a job search.
- 12.02 Secure information about a job.
- 12.03 Identify documents that may be required when applying for a job.
- 12.04 Complete a job application form correctly.
- 12.05 Demonstrate competency in job interview techniques.
- 12.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 12.07 Identify acceptable work habits.
- 12.08 Demonstrate knowledge of how to make job changes appropriately.
- 12.09 Demonstrate acceptable employee health habits.

13.0 DEMONSTRATE LEADERSHIP, COMMUNICATIONS, AND HUMAN RELATIONS SKILLS--The student will be able to:

- 13.01 Develop citizenship awareness and responsibility.

13.02 Describe the organization, operation, and the purposes of agricultural student organizations.
13.03 Organize and conduct meetings.
13.04 Demonstrate effective written and oral communication skills.
13.05 Demonstrate good interpersonal and human relations skills.

14.0 PREPARE GROWING MEDIA AND SEEDBEDS--The student will be able to:

14.01 Mix rooting and growing media according to plan requirements.
14.02 Sterilize rooting, potting, and growing media.
14.03 Collect and test a soil sample from field and potting media.
14.04 Adjust pH and nutritional levels of media.
14.05 Prepare planting beds and sites.
14.06 Fill and level benches and pots with media.
14.07 Demonstrate sanitation practices when handling and storing plant media materials.

15.0 PROPAGATE NURSERY STOCK--The student will be able to:

15.01 Collect propagation materials (seeds, cuttings, scions, bulbs, etc.) at proper time.
15.02 Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
15.03 Prepare flats and a seedbed and plant seeds.
15.04 Prepare a rooting bed.
15.05 Prepare propagation materials (seeds, cuttings, scions, etc.) for planting.
15.06 Apply growth stimulants to propagation materials.
15.07 Control propagation facility environment (moisture, temperature, light).
15.08 Transplant rooted propagation materials, including tissue culture transplants.
15.09 Demonstrate sanitation and safety practices when propagating.

16.0 PRUNE AND SHAPE NURSERY STOCK--The student will be able to:
16.01 Prune plants to achieve desired growth.
16.02 Select and use chemical growth regulators.
16.03 Root-prune nursery plants and trees.
16.04 Identify techniques for pruning specialty items (topiary, espalier, bonsai, etc.).
16.05 Prune plants at appropriate time.
16.06 Demonstrate sanitation and safety practices when pruning.

17.0 IRRIGATE PLANTS--The student will be able to:

17.01 Identify and use various types of irrigation components and systems.
17.02 Set up irrigation system for propagation area.
17.03 Set up irrigation system for greenhouse or enclosed structure.
17.04 Set up irrigation system for shadehouse.
17.05 Set up irrigation system for retail display area.
17.06 Set up irrigation system for field growing area.

18.0 HARVEST, PROCESS, AND SHIP NURSERY STOCK--The student will be able to:

18.01 Grade and harvest field-grown plants (ball, burlap, bare-root, "grow bags").
18.02 Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger).
18.03 Select, grade, and assemble container-grown plants.
18.04 Prepare for shipment, loading, and transporting harvested plant materials.
18.05 Use proper methods for preserving plant viability.
18.06 Comply with regulations regarding the inspection and movement of plant materials.
18.07 Demonstrate safety practices when harvesting, processing, and shipping nursery stock.

19.0 MARKET NURSERY STOCK--The student will be able to:

19.01 Label and merchandise plants.
19.02 Maintain clean and attractive merchandising and display areas.
19.03 Use various advertising methods to promote sales.
19.04 Take telephone orders.
19.05 Use sales catalog.
19.06 Greet customers.
19.07 Describe care and use of plants to customers.

20.0 OPERATE, REPAIR, AND MAINTAIN NURSERY EQUIPMENT AND FACILITIES--The student will be able to:

20.01 Determine equipment needs for the job.
20.02 Clean, calibrate, and maintain chemical sprayers.
20.03 Operate and service tractors, small gasoline engines, and power equipment.
20.04 Maintain electric motors and equipment.
20.05 Order parts and supplies.
20.06 Prepare and store equipment.
20.07 Perform simple plumbing and electrical repairs.
20.08 Build or repair frames, benches, and other greenhouse or nursery structures.
20.09 Demonstrate safety practices when working with equipment and facilities.

21.0 FERTILIZE NURSERY STOCK--The student will be able to:

21.01 Identify and evaluate influences of nutrients on plant growth.
21.02 Collect soil and leaf tissue samples for analysis.
21.03 Interpret and evaluate the results of soil and leaf tissue analysis.
21.04 Apply fertilizers using appropriate methods (dry, liquid, slow-release, injection, etc.)
21.05 Demonstrate proper handling and storage of fertilizers, observing safety precautions.

22.0 CONTROL PLANT PESTS--The student will be able to:

22.01 Identify plant disease symptoms and causal agents.
22.02 Identify insect and insect-like damage and causal agents.
22.03 Identify noxious weeds.
22.04 Select proper controls (biological, chemical, and cultural) for insects, diseases, and weeds.
22.05 Determine appropriate time, frequency, method, and amount of application of controls.
22.06 Apply controls safely.
22.07 Identify pesticide herbicide and chemical spray damage.
22.08 Comply with local, state, and federal pesticide regulations.
22.09 Identify vertebrate damage and causal agents.

23.0 MAINTAIN AND ANALYZE RECORDS--The student will be able to:

23.01 Analyze and maintain production and sales records.
23.02 Determine plant production costs.
23.03 Prepare a budget.
23.04 Prepare and maintain financial records.
23.05 Maintain current plant inventory.
23.06 Describe the use of a computer in a nursery operation.

FACILITIES

This section includes facility design criteria and a list of suggested equipment and supplies.

Design Criteria

Florida State Board of Education Rule 6A-2.032 specifies the size of space and occupant design criteria that school districts must follow in planning and designing facilities for the Nursery Operations program. However, the program guide committee recommended the following minimum, normal, and maximum size facilities for a one-time occupancy design capacity of twenty students.

Program Facility	Minimum (sq. ft.)	Normal (sq. ft.)	Maximum (sq. ft.)
Office Space per Instructor	100	150	200
Nursery Operations Laboratory	960	1,000	1,040
Classroom (related instruction)	500	525	550
Greenhouse	3,500	4,200	5,000
Lockers and Toilets	140	150	160
Reference	190	200	210
Storage, Flammable	165	175	185
Storage, Materials	400	600	800
Storage, Tools and Equipment	1,000	1,500	2,000
Storage, Pesticides	350	350	370
Walk-in Cooler	80	90	100

Exterior Space

Two to three acres
1,200-square-foot exterior concrete slab, fenced and covered
1,600-square-foot shadehouse

Specific Provisions

The nursery/horticulture program area should be an integral part of the total program of a school. Therefore, considerable thought and careful study should be given to locating the department, of which the Nursery Operations program is a part. Some of the factors that should be considered are:

The department should be easily accessible.
The department should have sufficient parking spaces.
The shop should be located and designed so that it avoids disturbing the other classes.
Facilities should have adequate heating and cooling.
Facilities should be located at ground level and have good drainage.
The laboratory and classroom should be adjacent to each other.
The office space and reference space should be a separate facility within the nursery/horticulture complex.

Classroom Facilities

The following are some of the suggested facilities for the classroom:

Adjustable shelves
Lockable storage cabinets
Rheostat lighting control
Adequate duplex electrical outlets (at least four)
Operable windows with shades for light control
Minimum of 18 lineal feet of 36-inch chalkboard
Minimum of 32 square feet of tackboard
Lockable cabinet for teacher use
Acoustic ceiling
Heating and air conditioning
Tilt wall-mounted screen for audiovisual use
Display racks for reference books and periodicals
Wall clock

Laboratory Facilities

The following are some of the recommended specifications for the laboratory:

Sufficient 240-volt power outlets for heavy-duty equipment
Sufficient 120-volt outlets for small equipment
Minimum of 24 square feet of tackboard
Lockable metal cabinets for storage
Wall clock
Adequate heating and cooling
Master electrical control switch
Metal storage shelves
Tool and equipment storage facilities
Adequate lighting
Adequate windows for lighting and ventilation
Washing and drinking facilities
Separate restrooms for men and women
Overhead doors at least 12 feet high
Work benches and tables
Drafting tables
Walls and ceilings at least 14 feet high
Pesticide storage with sump and ventilation

Suggested Equipment and Supplies

The following are some of the suggested equipment:

Soil augers
Planting bars (dibbles)
Auger bit sets
Brace-rachet set
Plumb bob
Water buckets
Can punches
Drill press
10-inch radial arm table saw
Spades
Claw hammers
Ballpeen hammers
Hatchets
Hoes

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Two 1/2-gallon gasoline containers
Wood chisel set
Extension cords
Air compressor
Drafting sets
Abrasive grinding dressers
Posthole diggers
Curved-blade cement edgers
Hand-cranked rotary duster
File sets
Flaring tool sets
Utility funnels
Spading and manure forks
300-watt seed germinator
Caulking guns
Soldering kit
Clear-plastic goggles
Grafting tools
Framing squares
100-foot steel tapes
Soil thermometer
Propane torch kit
Trowel set
Tube soil samplers
Machinist vises
Contractor-type wheelbarrows
Adjustable wrench sets
Pipe wrenches (10-, 14-, and 24-inch set)
3/8-inch portable drills
7-inch grinder
Concrete mixer
Chain saw
Paint sprayer
Hand truck
Automatic mist system
2,600-square-foot black shade cloth
Electric heating cable with thermostat
Greenhouse carts with pneumatic tires
Garden tractor
Mask respirators
Spring ounce sale
Spring pound sale
25-gallon electric greenhouse sprayer
Nonmercury greenhouse thermometers
Probe-type dial (to 200° F)
Shop vacuum
Battery charger
50-foot water hoses
Skid steer
First-aid kits
Extension ladder
Hand lenses
Carpenter's line levels
Pliers set
Railroad picks
Garden rakes
Grading rakes
Respirators
Bench rules
Hand crosscut saws
Hand ripsaws
Screwdriver sets
Hand sieve
Hedge shears
Round-point shovels
Hand herbicide sprayers
Soil tiller
Interval timer
Trowel
Soil shredder
2-gallon stainless steel insecticide sprayers
2-gallon stainless steel herbicide sprayers
Cyclone push-type spreader
30-horsepower tractor, with turf-type tires
Plastic garbage cans for storage
Wire basket
Electric hedge clippers
24-hour time clock
Fast-cycle time clock (adjustable for mist control)
Stereomicroscopes with light and cases
Pot grips
Push-type precision seeder
Can shears
Pliers
Shoulder-carry cyclon fertilizer spreader
Pipe cutter
Disc harrow with 3-point hitch
Lifting pin bars
Soil sterilizer
High/low recording thermometers
Fog-it water nozzles
Safety helmets
Hydraulic come-along jack
Disposable protective overalls
Shades for room light control
Lifting straps
Box scraper, 3-point hitch
Electric arc welder
Welding bench
Copper flaring tool

Oxyacetylene welder
Chain hoist
Sledge hammers
Box-end wrench set
1/4-inch x 3/8-inch drive socket
Bush hooks
Stepladder
Farm level with tripod
Hacksaws
Square-point shovels
Combination squares
Protective boots
Protective gloves
Potting bench
Pipe reamer
Tubing cutter
Sharpening stones
Drill bit set
Protective hard hats
Lopping shears
Pruning shears
Pruning saws
Electric handsaw
21-inch push-type gasoline-powered rotary mower
Sod cutter
Greenhouse/shadehouse
Seed flats

PROGRAM IMPLEMENTATION

This section includes information that may aid the instructor in planning the implementation of the Nursery Operations program: student admission requirements, a list of safety manuals, an explanation of the components of a student learning guide, cooperative training, and student organization participation.

Student Admission Requirements

Students enrolled in this program should be able to benefit from the instructional content with reasonable expectations for entry-level employment upon successful completion of the program.

In accordance with the Course Code Directory, the Nursery Operations program is offered to students at grade levels 10-12, 30, and 31. There are no specific student admissions criteria other than those that may be required by local education agencies.

Safety and Maintenance

As a Nursery Operations instructor, you should follow the general rules for safety included in the Florida Vocational Education Program Implementation Guide. Also, you should refer to safety manuals specific to Agribusiness and Natural Resources Education such as:

American Association for Vocational Instructional Materials (AAVIM)
120 Driftmier Engineering Center
Athens, Georgia 30602
- Applying Pesticides
- Developing Shop Safety Skills
- Safety Color Coding for the Shop

University of Florida
College of Agriculture
Department of Agriculture and Extension Education
Gainesville, Florida 32611
- Florida Vocational Agriculture Safety Manual

University of Florida
Institute of Food and Agricultural Sciences
Florida Cooperative Extension Services
Gainesville, Florida 32611
- Aerial Applicator
- Agricultural Pest Control Manual
- Applying Pesticides Correctly

New York State Department of Education
Bureau of Agricultural Education
1 Commerce Plaza, Room 1619
Albany, New York 12234
Safety Instruction Manual for Programs in Agriculture Education

For further information about safety manuals, contact the Instructional Materials Service, College of Agriculture, 305 Rolfs Hall, University of Florida, Gainesville, Florida 32611, (904) 372-0502, SUNCOM 622-0502.

Student Learning Guide

As mentioned in the Instructional Approach of the Florida Vocational Education Program Implementation Guide, competency-based vocational instruction (CBVI) is the most appropriate instructional approach to teaching students to become competent in Nursery Operations. In order to implement CBVI effectively and efficiently, you and the students should have access to competency-based instructional materials, such as student guides or modules.

A sample student learning guide is provided in the Appendix as an example for you to use when developing or adapting a set of learning guides or modules. This sample guide is not complete--it presents basic components of a competency-based student learning guide: introduction, objectives, a list of resources, learning activities, information sheets, self-check and answer sheet, activity sheets, a written test, and a performance test. An answer key to the written test is included in the instructor version of the learning guide.

The following components are often included in a student learning guide:

The **introduction,** which includes the intended outcome, the SPS for which the guide is developed, and an introduction to the guide stating why this topic is important to study and what this guide is about (Other information, such as the relationship between this guide and other guides, can be included on this sheet also.)

The **objectives,** which include both knowledge and performance objectives if the SPS calls for hands-on performance, but only knowledge objectives if the SPS requires knowledge-oriented competencies

The **resources,** which include instructional materials the students should use to study and tools and supplies students should have access to in order to complete this guide

The **learning activities,** which include a list of steps students should take in order to master the objectives

An **information sheet** may need to be developed if the existing instructional materials do not cover enough content for students to master the objectives

The **self-check,** which is a set of questions designed to help students review what they have studied

The **activity sheet,** which is designed to help students practice hands-on tasks for performance objectives (If the SPS does not require hands-on activity, this sheet is not included in the learning guide.)

The **written test,** which is to measure the student's achievement on the knowledge objectives

The **performance test,** which is designed to be used by the instructor/evaluator to assess the student's level of achievement on the performance objectives

The student learning guide may consist of two or more sets of the above components if the objectives need to be divided into two or more groups. Whatever format you use for the student learning guide, these components should be included in order to incorporate instructional events such as

1. gaining attention
2. stating objective
3. recalling prerequisites
4. providing instructional stimulus
5. providing learning guidance
6. eliciting performance
7. providing feedback
8. assessing performance
9. enhance retention and transfer.

Cooperative Training

Cooperative on-the-job training (OJT) for Nursery Operations may be taken by a student for one or more semesters. The specific student performance standards that the student should master to earn credit must be specified in the OJT training plan. This plan should include a list of OJT and in-school learning experiences and should be signed by the student, instructor, employer, and cooperative program coordinator. Besides the training plan, each student should have access to a work station with relevant tools and equipment that can facilitate the student's mastery of skills and knowledge necessary for the student to function as a beginning worker in nurseries.

The teacher-coordinator must visit each job site **at least** once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

The student must receive compensation for work performed on the job and may earn multiple credits.

For additional information on cooperative training, refer to the Suggested Guidelines for Cooperative Agribusiness Programs in Florida, which should be available through the regional offices of the Division of Vocational, Adult, and Community Education.

Student Organization Participation

The vocational student organization associated with the Nursery Operations program is Future Farmers of America (FFA).

FFA began early in the history of vocational education as instructors became aware of the need to provide practical training beyond the traditional classroom approach. Instruction was made more interesting through incorporating practical work experience, competitive judging events, and leadership development activities into the program. This learn-by-doing principle, the foundation of FFA, became the vehicle for providing leadership training and occupational incentive.

FFA provides leadership opportunities by challenging students with incentive awards and activities, which are specifically designed to be a part of the instructional program. Members learn through active participation how to conduct and take part in public meetings, how to speak in public, and how to take leadership roles in their schools and communities. These activities encourage entrepreneurship, help make better employees, and develop responsible citizens by uniting them with leadership opportunities in agriculture and agribusiness.

Participation in FFA helps develop a sense of responsibility, the ability to work cooperatively, sportsmanship, and an increased knowledge of agribusiness.

PROFESSIONAL DEVELOPMENT

Teacher Standards and Technical Updating

Certification

Listed below are the certification coverages included in the current Course Code Directory for Agribusiness and Natural Resources Education:

10-22, 31	VOC AGRI 4 AGRI 4 HORTICULTURE 7	30 VOC AGRI 4 AGRI 2, 4 HORTICULTURE 7

Other Qualifications

Local education agencies may qualify the teacher to teach Vocational Agriculture by having fulfilled one or more of the following requirements:

1. The teacher has obtained a regular or temporary Florida teacher's certificate with appropriate coverages.

2. The teacher has been approved by the local school board, in accordance with official school policy.

3. The teacher holds a regular or temporary Florida teacher's certificate with other than appropriate coverage, but has met all occupational experience requirements for appropriate certification and has been approved by the local school board to teach out of field.

Community college instructors should meet the requirements of the individual college.

Technical Updating

For technical and professional updating inservice activities, instructors at high schools and area vocational-technical centers should contact the district Teacher Education Center (TEC) and Agricultural Education supervisors. Community college instructors should contact the department of Program and Staff Development of the individual college.

Professional Organizations and Support Services

All-America Rose Selections
P. O. Box 218
Shenandoah, IA 51601

American Association of Nurserymen
1250 I Street, NW, Suite 500
Washington, DC 20005

American Horticultural Society
P. O. Box 0105
Mt. Vernon, VA 22121

American Nurseryman
310 S Michigan Avenue
Chicago, IL 60604

American Rose Foundation
P. O. Box 30000
Shreveport, LA 71130

American Sod Producers Association
4415 W Harrison Street
Hillside, IL 60162

BPI, A Growers Organization
P. O. Box 286
Okemos, MI 48864

Florida Flower Association
P. O. Box 1569
Ft. Myers, FL 33902

Florida Nursery Growers Association
5401 Kirkman Road, Suite 650
Orlando, FL 32819

Garden Industry of America
P. O. Box 1092
Minneapolis, MN 55440

Horticulture Awareness Association
14575 Mercury Drive
Grand Haven, MI 49417

The Irrigation Association
1911 N Fort Myer Drive, Suite 1009
Arlington, VA 22209

Landscape Nursery Council
28E Rahn Road
Dayton, OH 45429

National Association of Plant Patent Owners
1250 I Street, NW, Suite 500
Washington, DC 20005

National Landscape Association
1250 I Street, NW, Suite 500
Washington, DC 20005

North American Flowerbulb Wholesalers Association
P. O. Box 581
Middletown, NJ 07748

American Society of Agronomy
677 S Segoe Road
Madison, WI 53711

Associated Landscape Contractors of America
405 N Washington Street
Falls Church, VA 22046

The Fertilizer Institute
1015 18th Street, NW
Washington, DC 20036

Florida Foliage Association
P. O. Box Y
Apopka, FL 32703

Florida Turfgrass Association
302 S Graham Avenue
Orlando, FL 32803-6332

Horticultural Research Institute
1250 I Street, NW, Suite 500
Washington, DC 20005

International Garden Horticultural Industry Association
26 Pine Street
Dover, DE 19901

Landscape Maintenance Association
P. O. Box 728
Largo, FL 34649

National Association of Lawn and Garden Manufacturers
1740 E Joppa Road
P. O. Box 28279
Baltimore, MD 21234

National Equipment Servicing Dealers Association
Box 121, E Main Street
Jefferson Valley, NY 10535

National Lawn and Garden Distributors Associaton
1900 Arch Street
Philadelphia, PA 19103

North American Gladiolus Council
Commercial Growers Division
5007 60th Street, E
Bradenton, FL 34203

Nursery Association Executives
P. O. Box 1871
Bozeman, MT 59771

Nursery Marketing Council
1250 I Street, NW, Suite 500
Washington, DC 20005

Outdoor Power Equipment
Distributors Association
1900 Arch Street
Philadelphia, PA 19103

Outdoor Power Equipment Institute
1901 L Street, NW, Suite 700
Washington, DC 20036

Perennial Plant Association
217 Howlett Hall
2001 Fyffe Court
Ohio State University
Columbus, OH 43210

Planting Council
119B Breat Road
Bedford, MA 01730

Professional Lawn Care Association
of America
1225 Johnson Ferry Road, Suite B-220
Marietta, GA 30067

Roses Incorporated
1152 Haslett Road
Haslett, MI 48840

Society of American Florists
1601 Duke Street
Alexandria, VA 22314

Southern Florist and Nurseryman
Reader Service Department
Box 1868
Fort Worth, TX 76101

Wholesale Florists and Florist
Suppliers of America
5313 Lee Highway
Arlington, VA 22207

Wholesale Nursery Growers of
of America
1250 I Street, NW, Suite 500
Washington, DC 20005

INSTRUCTIONAL RESOURCES

This section lists print, audiovisual, and computer software resources. Resource materials have been identified by Florida Educational Information Service and the committee members but have not been reviewed for their quality. Additional instructional materials may be obtained from the sources listed at the end of this section.

Print Materials

Agricultural Occupations. Education for Employment Task Lists. Grayslake, Ill.: Lake County Area Vocational Center; Springfield: Illinois State Board of Education, 1986.

Albracht, James, ed. Basic Core Curriculum Project: Horticulture I, II, and III. Pittsburg, Kans.: Pittsburg State University, 1982.

Architectural Drafting Curriculum Guide. Michigan Trade and Industrial Education. East Lansing: Michigan State University; Lansing: Michigan State Department of Education, 1984.

Ball, Vic, ed. Ball Red Book. 14th ed. Englewood Cliffs, N.J.: Reston Publishing Co., 1984.

Barnard, Edward L., and Dixon, Wayne N. Insects and Diseases: Important Problems of Florida's Forest and Shade Tree Resources. Tallahassee, Fla.: Florida Department of Agriculture and Consumer Services, 1983.

Baudendistel, Robert F. Horticulture: A Basic Awareness. 2nd ed. Englewood Cliffs, N.J.: Reston Publishing Co., 1982.

Be a Building Watcher on the Street Where You Live. Indianapolis: Historic Landmarks Foundation of Indiana, 1986.

Bender, Gerald F., and Probasco, Jack F. "Include Passive Solar in Your Renovations." American School and University 53 (April 1981): 38, 40, 41-42.

Bingaman, Charles E., ed. Florida Certified Nursery Professional Manual. Orlando: The Florida Nurserymen and Growers Association, 1984.

Biondo, Ron, et al. Core II Materials for Metropolitan Agriculture/Horticulture Programs, Units G-L. Urbana: Illinois University; Springfield: Illinois State Board of Education, 1982.

Biondo, Ron, et al. Core III Materials for Metropolitan Agriculture/Horticulture Programs, Units J-M. Urbana: Illinois University; Springfield: Illinois State Board of Education, 1982.

Boodley, James W. The Commercial Greenhouse. Albany, N.Y.: Delmar Publishers, 1981.

Brickman, Dick. "How to Cut Landscape Maintenance Costs." American School and University 54 (June 1982): 28-33.

Career Preparation for Agriculture/Agribusiness. Hightstown, N.J.: McGraw-Hill Book Co., 1980.

Compact Tractor Service Manual. 2nd ed. Overland Park, Kans.: Intertec Publishing, 1986.

A Comprehensive Horticulture Curriculum Guide for New Jersey Schools. New Brunswick, N.J.: Rutgers, The State University; Trenton: New Jersey State Department of Education, 1985.

Designing the Landscape. Columbus: Ohio Agricultural Education Curriculum Materials Service, 1980.

Developing a Landscape Plan. Agricultural Occupations Curriculum. Springfield: Illinois State Board of Education, 1981.

Dig Manual: A Guide to the Identification and Selection of Florida Ornamental Plants. Tallahassee: State of Florida, 1984.

Furuta, Tokuji. Interior Landscaping. Englewood Cliffs, N.J.: Reston Publishing Co., 1982.

Geer, Barbara Farabough. Basic Horticulture. Stillwater, Okla.: Oklahoma State Department of Vocational and Technical Education, 1981.

Grades and Standards for Nursery Plants, Part I. 3rd ed. Gainesville: Florida Department of Agriculture and Consumer Services, 1973.

Grades and Standards for Nursery Plants, Part 2: Palms and Trees. Gainesville: Florida Department of Agriculture and Consumer Services, 1965.

Graf, Alfred B. Tropica: Color Encyclopedia of Exotic Plants. 3rd ed. East Rutherford, N.J.: Roehrs Co., 1986.

Graf, Alfred B. Pictorial Cyclopedia of Exotic Plants: Exotica Series IV International. East Rutherford, N.J.: Roehrs Co., 1985.

Gould, Bryant, and Finci, David. "Site Plan: A First Step." American School and University 58 (April 1986): 60, 62, 64, 66.

A Guide to Safe Pest Control around the Home. Ithaca, N.Y.: New York State College of Agriculture and Life Sciences, 1979.

Hemp, Paul, et al. Core IV Materials for Metropolitan Agriculture/Horticulture Programs. Urbana: Illinois University; Springfield: Illinois State Board of Education, 1984.

Hill, Lewis, ed. Pruning Simplified. Pownal, Vt.: Storey Communications, 1986.

Holmes, Francis W. "How to Get Trees." American School and University 53 (April 1981): 40f.

BEST COPY AVAILABLE

Horticultural Competency Worksheets. St. Paul: Hobar Publications, n.d.

Horticulture: Landscape. Lansing: Michigan State Board of Education, 1985.

Hudson, Coy L. Horticulture Technology: A Competency-based Curriculum Manual. Raleigh: North Carolina Department of Community Colleges, 1979.

Implementing the Landscape Plan. Agricultural Occupations Curriculum. Springfield: Illinois State Board of Education, 1981.

Improvement of School Climate. Ridgecrest, Calif.: Sierra Sands Unified School District, 1984.

Ingels, Jack E. Landscaping: Principles and Practices. 2nd ed. Albany: Delmar Publishers, 1983.

Ingels, Jack E. Ornamental Horticulture: Principles and Practices. Albany: Delmar Publishers, 1985.

Ingvalson, Brian I. Competency-based Horticulture: Student Handbook and Planning Guide. Forest Lake, Minn.: Karen Ann Publishing Co., 1977.

Janick, Jules. Horticultural Science. New York: Freeman and Company, 1986.

Jensen, Delores. Resource Book for Vocational Programs for Mentally Handicapped Adults. Kelowan, B.C.: Okanagan College; Victoria: British Columbia Department of Education, 1985.

Lamberth, Edwin E. Technical Competencies in Greenhouse Management and Landscape Design Needed by High-School Teachers of Vocational Horticulture in Tennessee. Research Report Series No. 5. Cookeville: Tennessee Technological University, 1983.

Landscape Plant Identification. Rev. ed. College Station: Texas A & M University, 1975.

Lawn, Garden, and Power Equipment Owner's Manual. Overland Park, Kans.: Intertec Publishing, 1985.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Developing a Landscape Plan. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Implementing the Plan. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Maintaining Landscapes. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Nursery Propagation. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Planting Turf. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Soils and Fertilizers. Carbondale, Ill.: Southern Illinois University, 1980.

Legacy, Jim, et al. Competency-based Teaching Materials in Horticulture: Tree Identification. Carbondale, Ill.: Southern Illinois University, 1980.

Libby, Thomas J. "Reclaiming Our Turf." School Arts 79 (May 1980): 10-12.

Lindley, Charles. "Enhancement through Landscaping." CEFP Journal 23 (July-August 1985): 4-7.

Luft, Vernon D., and Backlund, Paul. Introduction to Horticulture, Unit A-10. Fargo: North Dakota State University; Bismarck: North Dakota State Board for Vocational Education, 1981.

Maday, John. Develop and Field Test Written and Performance Student Achievement Measures for Gardening-Groundskeeping and Landscape Operations, Final Report. Gainesville: University of Florida; Tallahassee: Florida Department of Education, 1985.

Manaker, George H. Interior Plantscapes: Installation, Maintenance, and Management. Englewood Cliffs, N.J.: Prentice-Hall, 1981.

Maxwell, Lewis S., and Maxwell, Betty M. Florida Lawns and Gardens. Rev. ed. Tampa: Lewis S. Maxwell, Publisher, 1980.

Maxwell, Lewis S., and Maxwell, Betty M. Florida Plant Selector: A Guide to Choice and Use of Over 100 Landscape Plants. Rev. ed. Tampa: Lewis S. Maxwell, Publisher, 1975.

McDaniel, Gary. Ornamental Horticulture. 2nd ed. Englewood Cliffs, N.J.: Reston Publishing Co., 1982.

McDonald, Sally A. Applying Pesticides Correctly: A Guide for Private and Commercial Applicators. Gainesville: University of Florida, 1984.

O'Banion, B. J. Landscaping Your Home. Columbus: Ohio State University, 1977.

Oregon Agriculture III Curriculum Guide. Corvallis: Oregon State University; Salem: Oregon State Department of Education, 1983.

Perkins, Kent D., and Payne, Willard W. Guide to the Poisonous and Irritant Plants of Florida. Gainesville: University of Florida, 1981.

Pierceall, Greg. Residential Landscapes: Graphics, Planning, and Design. Englewood Cliffs, N.J.: Reston Publishing Co., 1983.

Poisonous Plants of the Southern United States. Gainesville: University of Florida, n.d.

Proceedings of the Annual Southwest Park and Recreation Training Institute (28th). Lubbock: Texas Tech University, 1983.

Reiley, H. Eward, and Shry, Carroll L., Jr. Introductory Horticulture. Albany: Delmar Publishers, 1983.

Richardson, William B., and Moore, Gary. Working in Horticulture. Gregg/ McGraw-Hill, 1980.

Riding Lawn Mower Service Manual. 3rd ed. Overland Park, Kans.: Intertec Publishing, 1987.

Rotary Tiller Service Manual. 2nd ed. Overland Park, Kans.: Intertec Publishing, 1985.

Safety Instruction Manual for Programs in Agricultural Education. Albany: State Education Department, 1981.

Shry, Carroll L., Jr., et al. "Theme: Staying Current--Horticulture." Agricultural Education Magazine 59 (December 1986): 4-17, 20-23.

Sod Production and Marketing. Des Moines: Iowa Department of Public Instruction; Iowa State University, 1986.

Southwest Park and Recreation Training Institute (27th). Lubbock: Texas Tech University; Arlington, Va.: National Recreation and Park Association; Oklahoma City: Oklahoma State Department of Tourism and Recreation, 1982.

Still, Steven. Herbaceous Plants. Champaign, Ill.: Stipes Publishing Co., 1982.

Turgeon, Al. Turfgrass Management. Englewood Cliffs, N.J.: Reston Publishing Co., 1985.

Urban Horticulture: Scope and Sequence. Nashville: Davison County Metropolitan Public Schools; Tennessee State Department of Education; 1984.

Walking Lawn Mower Service Manual. 3rd ed. Overland Park, Kans.: Intertec Publishing, 1987.

Ware, George W. Complete Guide to Pest Control, with and without Chemicals. Fresno, Calif.: Thomson Publications, 1980.

Williams, T. Jeff. How to Select, Use, and Maintain Garden Equipment. St. Paul: Hobar Publications, 1981.

Zim, Herbert S., and Martin, Alexander C. Trees: A Guide to Familiar American Trees. Racine, Wisc.: Western Publishing Co., 1956.

Audiovisual Materials

Disease of Landscape Ornamentals. Columbus: Ohio State University, 1985.

Field Wildflowers. Columbus: Ohio State University, 1985.

Herbaceous Ornamental Plants. Columbus: Ohio State University, 1984.

McCann, Kevin. Selected Landscape Plants. Columbus: Ohio State Department of Education, Ohio State University, 1984.

Nursery Landscaping Plant Identification. Columbia: University of Missouri, 1980.

Ornamental Annual Plants and Their Uses. Columbus: Ohio State University, 1985.

Selected Landscape Plants. Columbus: Ohio State University, 1984.

Selected Trees Adaptable to Urban Situations. Columbus: Ohio State University, 1980.

State FFA Nursery and Landscape Contest. Austin: Texas Education Agency, 1984.

Transplanting, Guying, and Staking Landscape Plants. Columbus: Ohio State University, 1982.

Wetland Wildflowers. Columbus: Ohio State University, 1980.

Woodland Wildflowers. Columbus: Ohio State University, 1980.

Computer Software

Agri-Quiz: Nursery Landscape Quiz. West Bend, Wis.: Midwest Agribusiness Services, 1984.

Landscape Design. Design Your Own Home Series. Novato, Calif.: Avant-Garde, 1984.

Sources for Instructional Materials

The following organizations are sources from which you can acquire instructional materials.

Print Materials

AAVIM
120 Driftmeir Engineering Center
Athens, GA 30602

AgAccess
P. O. Box 2008
Davis, CA 95617

A.C.S. Software Publishing
P. O. Box 5034
Oregon City, OR 97045

Bedding Plants
2043 Hamilton Road
P. O. Box 286
Okemos, MI 48864

BLS Inc.
2503 Fair Lee Road
Wilmington, DE 19810

Careers Inc.
Educational Researchers and Publishers
1211 10th Street, SW
P. O. Box 135
Largo, FL 34649-0135

Chevron Chemical Company
Public Relations
P. O. Box 3744
San Francisco, CA 94119

Education Design
47 W 13th Street
New York, NY 10011

Educators Progress Service
214 Center Street
Randolf, WI 53956

Encyclopedia Britannica Education Corporation
425 N Michigan Avenue
Chicago, IL 60611

Fearon Education
David Street Lake Publishers
19 Davis Drive
Belmont, CA 94002

Guidance Associates
Communications Park, Box 3000
Mount Kisco, NY 10549-0900

Horticultural Books
P. O. Box 107
Stuart, FL 33494
Attn: Edwin A. Menninger

The Idea Bank
P. O. Box 23994
Tempe, AZ 85282

Interstate Printers & Publishers
P. O. Box 50
Danville, IL 61834-0050

Landscape Specialists
44280 McKenzie Highway
Leaburg, OR 97489

National Farm Book Company
5149 Highway T
P. O. Box 206
Amherst, WI 54406

ORTHO--Chevron Chemical Company
742 Bancroft Way
Berkeley, CA 94710

Safety and Systems Management
13895 Industrial Park Boulevard
Minneapolis, MN 55441

Safety Rules
3727 Joan Drive
Waterloo, IA 50702

Southfornet Science Library
University of Georgia
Athens, GA 30602

Teaching Aids
P. O. Box 1798
Costa Mesa, CA 92628-7098

Telsco Industries
Box 18205
Dallas, TX 75218

Thompson Publications
P. O. Box 9335
Fresno, CA 93791

The Training Files
1001 Bridgeway, Suite 304
Sausalito, CA 94965
Attn: Betty Yett or Frances Martin

University of California
Division of Agriculture & Natural Resources
6701 San Pablo Avenue
Oakland, CA 94608-1239

Audiovisual Materials

Audio-Forum
96 Broad Street
Guilford, CT 06437

Audio Visual Production
Department of Horticulture
Purdue University
West Lafayette, IN 47907

Audio-Visual Resource Center
8 Research Park
Cornell University
Ithaca, NY 14850

The AVI Publishing Company
250 Post Road, E
P. O. Box 831
Westport, CT 06881

Close-Up Photo
4 Little River Lane
Hendersonville, NC 28739

Coast Telecourses
10231 Slater Avenue
Fountain Valley, CA 92708

Creative Educational Video
5147-A 69th Street
Lubbock, TX 79424

Educational Filmstrips
1464 19th Street
Huntsville, TX 77340

Landscape Specialists
Videotape Division
28505 Siesta Lane
Eugene, OR 97402

Michigan Media
The University of Michigan
Media Resource Center
400 Fourth Street
Ann Arbor, MI 48103

Modern Talking Picture Service
5000 Park Street, N
St. Petersburg, FL 33709

National Audiovisual Center
Washington, DC 20409

National Information Center for
Educational Media
P. O. Box 40130
Albuquerque, NM

The National Video
Clearinghouse
100 Lafayette Drive
Syosset, NY 11791

Photocom
Box 3135
Pismo Beach, CA 93449

Reinforcement Agri-Media
University of Minnesota
Media Distribution
Box 734 Mayo
Minneapolis, MN 55414

Vernard Films
Box 1332
Peoria, IL 61654

Vocational Media Associates
P. O. Box 1050
Mount Kisco, NY 10549-0050

For more information about instructional resource materials, refer to the Program Guide for Ornamental Horticulture (1986) or contact the Instructional Materials Service, 305 Rolfs Hall, University of Florida, Gainesville, FL 32611, (904) 392-0502, SUNCOM 622-0502.

FEIS Service

If you need (1) information about copyright; (2) a list of instructors teaching in agriculture programs in Florida; (3) journal articles or project reports on specific topics; (4) curriculum and instructional materials; or (5) information on current trends, issues, and research, please contact the Florida Educational Information Service (FEIS), Center for Instructional Development and Services, College of Education, Florida State University, 2003 Apalachee Parkway, Tallahassee, Florida 32301, (904) 487-2054. FEIS will tailor its service to meet your needs on information concerning resource materials.

APPENDIX

Sample Student Learning Guide

SAMPLE

STUDENT LEARNING GUIDE_____

Program: Nursery Operations

Course: Nursery Operations 4

Intended Outcome: Identify Growing Media and Apply Fertilizers

SPS 05.06: Collect a Soil Sample for Soil Analysis

Introduction: A proper soil sample prepared for laboratory analysis is essential to the process of determining the appropriate fertilizer and soil improvements to achieve optimum plant growth. The choice of a fertilizer depends on the unique soil conditions, nutrient composition, and the pH of the soil. Proper sampling of the soil is, therefore, a first step in the process of growing healthy plants.

This learning guide is designed to help you learn how to collect a soil sample and prepare it for a laboratory test.

OBJECTIVES

Knowledge Objectives

1. Identify the equipment required for taking soil samples.
2. Identify the techniques and process of obtaining a representative soil sample.
3. Fill out the soil test information sheet that must accompany the soil sample.

Performance Objective

Given a planting bed or other field area, a tile spade or trowel, a soil auger or probe, and plastic bags or other suitable containers, take a representative soil sample and prepare it for lab analysis.

Your performance on all tasks listed below should be evaluated as satisfactory.

Tasks

1.0 Prepare the soil surface for the sample collection by
- 1.1 gathering the necessary tools and equipment
- 1.2 choosing locations representative of the whole area
- 1.3 completing a map of the area from which soil cores are to be collected
- 1.4 scraping off top debris or residue
- 1.5 removing foreign materials from the soil surface.

2.0 Collect the soil sample by
- 2.1 collecting a representative sample from the recommended depth
- 2.2 collecting an appropriate number of samples for a particular area (20-30 for limed soil)
- 2.3 taking equal amounts of soil from each location.

3.0 Prepare the soil sample for the laboratory by
- 3.1 breaking up lumps, spreading the soil out, and drying it at room temperature
- 3.2 reducing coarse granules to wheat-grain size or smaller
- 3.3 mixing soil cores in the clean container
- 3.4 placing the sample in an appropriate container
- 3.5 numbering and labeling the sample container with the date, depth, and location.

4.0 Complete the task by
- 4.1 completing the soil test information sheet
- 4.2 cleaning and storing all tools and equipment.

RESOURCES

References

Floriculture: A Teacher and Student Performance Guide. Tallahassee: State of Florida, Division of Vocational Education, August 1977.

The Nursery Worker, Student Manual. Columbus: Ohio Agricultural Education Curriculum Materials Service, Department of Agricultural Education, The Ohio State University, 1984.

Soil Test Information Sheets.* Gainesville: Institute of Food and Agricultural Sciences, University of Florida, n.d.

Which Soil or Water Test Should I Ask For?* (Notes in Soil Science, No. 2.) Gainesville: Institute of Food and Agricultural Sciences, University of Florida, n.d.

Tools and Equipment

A tile spade
A trowel
A soil auger
A soil probe
Plastic bags or other suitable containers

*Available at County Cooperative Extension Service Office.

LEARNING ACTIVITIES

Objective: Take a representative soil sample and prepare it for lab analysis.

Procedures:

1. Read The Nursery Worker, Student Manual about soil sampling, pp. 75-80.
2. Study Floriculture, Chapter 1, "Take Soil Samples," pp. 1-4.
3. Study Information Sheet 1 for the equipment used for collecting soil samples and for using sampling tools.
4. Study Information Sheet 2 for the steps involved in collecting a representative soil sample.
5. Complete the Self-check and check your answers with the Answer Sheet.
6. Complete the Activity Sheet and check your work with your instructor.
7. Complete the Written Test.
8. Complete the Performance Test.

Figures 1 and 2 show the tools used in collecting soil samples and the method of using sampling tools.

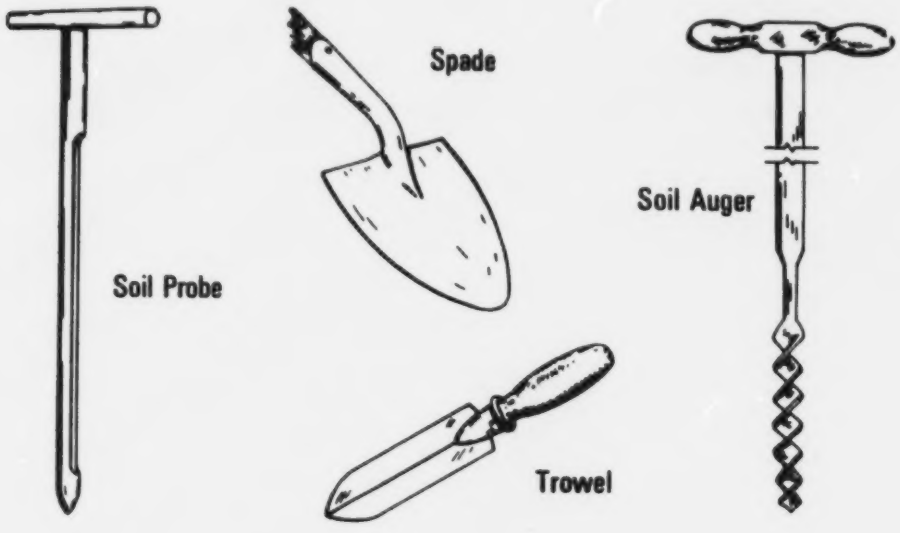


Figure 1. Tools Used in Collecting Samples

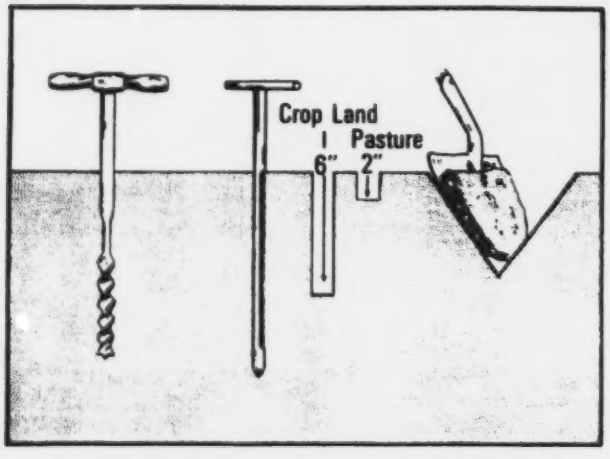


Figure 2. Using Sampling Tools

INFORMATION SHEET 2

A soil sample is a composite of many cores from one defined area. The steps for collecting a representative soil sample are listed below.

STEP 1: Gather the tools to be used in taking the sample: a clean bucket, a spade or trowel, a knife, and a soil probe or auger.

STEP 2: Identify the general area and mark the locations on a map or grid where samples are to be procured. This will aid you in keeping an accurate record of soil test reports.

STEP 3: Choose locations representative of the whole area. Avoid sampling strips near trees, old fence rows, chemical spill areas, roadbeds, or other nonrepresentative areas.

STEP 4: Scrape off top debris or residue and remove foreign materials from soil surface.

STEP 5: Using a clean container, collect soil cores at appropriate depth. Cropland would be sampled at plow depth and pastureland and lawns at the top two or three inches. Take cores at random in a zig-zag pattern over the target area.

STEP 6: Collect cores from 10-15 locations representative of the area. If the soil has been recently limed or fertilized, 20-30 cores are preferred per area.

STEP 7: Put cores of uniform size in a clean bucket and mix thoroughly.

NOTE: If tests are to be made for micronutrients, use only a clean plastic bucket.

STEP 8: Break up clods or lumps and spread the soil out.

STEP 9: Air-dry the soil sample at room temperature. Do not use artificial heat, which can alter the sample for analysis.

STEP 10: Mix soil samples and retain one pint.

STEP 11: Place one pint of mixed soil in a clean paper bag or other suitable container such as a small plastic bag.

STEP 12: Label the sample including number, date, depth, and field location.

STEP 13: Fill out soil test information sheets shown on the following pages.

STEP 14: Clean and store all tools and equipment in appropriate places.

STEP 15: Take the dry soil sample and information sheet to your county agricultural extension office and pay the fee.

Home Lawn and Garden
SOIL TEST

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611

SOIL SCIENCE DEPARTMENT

Direct any questions regarding this test or the interpretation of the results to your county Extension agent.

Mailing Address (please print):

Name _____

Address _____

City _____ State _____ Zip _____

County _____ Date _____ Phone _____

This is the appropriate soil test for you if the following points describe your lawn and garden situation:

- You use complete fertilizer and do not intend to use single-element fertilizers.
- You want to know if your soil pH is appropriate for the plants you are growing.

Fill in all requested information, using one line per sample and additional sheets for more than 4 samples.

Lab Use Only	Soil Sample Number or Other Identification	Crop Code	Acreage or Square Feet	Charge ($1.00 per sample)

Please enclose payment and this sheet in same package as sample (s).

Cash ____ Check ____ M.O. ____ Total Charge $ _____

NOTE ANY SPECIAL PROBLEMS FOR EXTENSION AGENT:

Points To Consider

- Before you test, know what you will do with the results.
- Most lawns and gardens are fertilized with a standard rate of complete fertilizer. This is done because relatively few homeowners find fertilization with single-element fertilizers to be worth the time and effort required. If this is the case with you, pH is the only soil test measurement which will be useful. Use this form to request your test.
- A soil sample must be representative of the area that is being tested. The results can be no better than the sample.
- Sample early so you will have time to treat the soil before planting if lime or other materials are needed.

How To Take, Prepare, and Submit Garden and Lawn Soil Samples

1. Sample separately those areas that differ significantly in soil type, appearance, crop, or past treatment and that will be managed differently. Sample problem areas separately or exclude them from the sample.
2. For each sample, collect soil from about five spots in the area being represented. Mix these well in a clean container. Sample to the depth that the soil will be cultivated (usually six to eight inches deep). Sample lawns two to four inches deep. Take the same volume of soil from the entire depth of sampling (i.e., Don't take more from the top two inches than from the bottom two inches or vice versa.)
3. Spread out on paper or other suitable material to air dry. After mixing the soil thoroughly, place about one pint of soil in a labeled sample bag.
4. Fill out completely this information sheet. Include a crop code from the following list. The crop code is necessary to get the correct lime recommendation.

Lawns	Crop Code	Home Grounds	Crop Code
bahiagrass lawn	72	azaleas, camellias, gardenias, hibiscus, or ixora	79
bermudagrass lawn	73		
carpetgrass lawn	74	blueberries	67
centipedegrass lawn	75	dooryard citrus	61
ryegrass lawn	76	trees (landscape)	81
St. Augustinegrass lawn	77	vegetable garden	82
zoysiagrass lawn	78	woody ornamentals in landscape	81

5. Calculate charges. Make check payable to: **IFAS Soil Testing Laboratory**
6. Include this sheet and the payment in the shipping box with the samples. Soil sample bags and addressed shipping boxes are available free from your county Cooperative Extension Service Office.

GREENHOUSE & POTTING MEDIA TEST

INTENSITY & BALANCE TEST

specialized analyses offered by

Extension Soil Testing Laboratory
IFAS, University of Florida

These tests are designed for estimating the nutritional needs of plants grown under intensive management typical of commercial horticultural enterprises. Specialized interpretation of the results is necessary. Results are generally not meaningful for agronomic or home garden situations.

1. Soil to be analyzed for Intensity and Balance must not be allowed to dry out. Place about a pint of the moist soil taken from the field in a plastic bag, close so it is airtight, and send promptly for analysis.
   For the Greenhouse and Potting media test, collect a representative sample, mix well and place about 1 pint in a labeled sample bag.
2. Fill out the reverse side of this information sheet completely. Make sure that the identification on the sample bag and in the "sample identification" column are the same, and that all samples are listed separately on the information sheet. Be sure to indicate which analysis is desired.
3. Calculate charges. Make check or money order payable to:
   IFAS Soil Testing Laboratory
4. Include this sheet and payment in the box with the samples. Corrugated shipping boxes are available free from the county Cooperative Extension Service offices.

For additional information on the tests listed below, see Notes in Soil Science, No. 2, Which Soil or Water Test Should I Ask For, available at county Cooperative Extension Service offices.

Analysis Code	Analysis Name	(Determinations Made)	Charges
7	Intensity & Balance	(soluble salts, NO_3-N, K, Ca, Mg, Na, Cl)	$3.00
8	Greenhouse & Potting Media	(pH, soluble salts, NO_3-N, P, K, Ca, Mg)	$4.00

SOIL SCIENCE DEPARTMENT

GREENHOUSE & POTTING MEDIA TEST

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611
Phone 904-392-1950

mailing address (please print):

name_____

address_____

city_____ State_____ zip_____

county_____ date_____

Fill in all requested information, using one line per sample.

lab use only	sample identification	crops (s) to be grown	acreage or square ft.	please check test desired		charges
				intensity & balance (CODE 7)	greenhouse & potting media (CODE 8)	

SPECIAL PROBLEMS:

Please enclose payment and this sheet in same package as sample (s).

total charge $ _____

59

Producer Soil Test Information Sheet

SOIL SCIENCE DEPARTMENT

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611
Phone 904-392-1950

mailing address (please print):

name_____

address_____

city_____ state_____ zip_____

phone_____ county_____ date_____

Fill in all requested information, using one line per sample and additional sheets for more than 10 samples.

lab use only	soil sample identification	crop (s) code (s)	acreage or square feet	analyses requested	charges

SPECIAL PROBLEMS:

cash___ check___ m.o.___ total $ _____

Please enclose payment and this sheet in same package as sample (s).

bill to:_____

account number _____

HOW TO TAKE, PREPARE, AND SUBMIT SOIL SAMPLES

Remember: A soil sample must be representative of the area that is being tested.

1. Sample separately those areas that differ in soil type, appearance, crop, or past treatment and will be managed differently. Sample problem areas separately or exclude them from the sample. In large fields, one sample should represent no more than 20 to 30 acres unless the field is very uniform and will be managed the same.
2. For each sample, collect soil from 20 or more spots in the area and mix these well in a clean container. Do not use a metal container if micronutrients are to be determined. Sample to the depth that the soil will be plowed (usually 6 inches). For established lawns, sample only the top 2 or 3 inches of soil.
3. Spread out on paper or other suitable material to air dry. After mixing the soil thoroughly, place about one pint of soil in a labeled sample bag.
4. Fill out completely this information sheet. Include crop code (s) if fertilization recommendation is desired (see reverse side of form). Check that the identification on the sample bag and in the "sample identification" column is the same, and all samples are listed separately. Include the code for those analyses desired. Do not request both analysis codes 1 and 2 for the same sample.
5. Calculate charges. Make check or money order payable to:
   IFAS Soil Testing Laboratory.
6. Include this sheet and the payment in the shipping box with the samples. Soil sample bags and addressed shipping boxes are available free from your county Cooperative Extension Service office.

IFAS Form 2672

- Standard fertilization and liming recommendations based on your soil test results will be supplied along with the test results if you indicate a crop code. Please write the appropriate crop codes on the front of this form. If your croping situation is not in the list of codes below, routine soil tests may not be appropriate. In such instances, consult your County Extension Agent before sending soil samples for testing.
- Use special forms for requesting Home Lawn & Garden Soil Tests, Greenhouse and Potting Media, Intensity and Balance, or Forestry Soil Tests.

AGRONOMIC CROPS

Crop code	Field Crops
1	corn (non-irrigated), 10,000 plants/acre
2	corn (non-irrigated), 12,500 plants/acre
3	corn (non-irrigated), 15,000 plants/acre
4	corn (irrigated), 20,000 plants/acre
5	corn (irrigated), 25,000 plants/acre
6	corn (irrigated), 30,000 plants/acre
9	cotton
7	grain sorghum
10	peanuts
8	small grains for grain
11	soybeans
13	sugarcane for syrup
12	tobacco (flue cured)
29	wheat for grain

Crop code	Pastures & Forage Crops
16	small grains for forage
15	sorghum, forage type for silage
14	summer forages (ex, millet or sorghum)
21	warm season legumes or legume-grass mixtures (aeschnomene, alyce clover, desmodium, hairy indigo, perennial peanuts, & other tropical legumes)
22	cool season legumes or legume-grass mixtures (lupines, sweet clover, vetches & all true clovers—white, red, arrowleaf, crimson, subterranean)
23	alfalfa
24	bahiagrass pasture
25	improved perennial grasses other than bahiagrass (bermuda, digit, limpo, star)
26	cool season annual grasses (small grains and ryegrass)

VEGETABLE CROPS

NOTES: 1. Please use Code 82 for gardens where more than one kind of vegetable is grown. Codes for particular vegetables will result in fertilizer recommendations for commercial vegetable production which are not appropriate for home vegetable gardens.
2. "Mulched" refers to situations where the crop is grown under plastic or similar impermeable mulch.

Crop code		Crop code		Crop code		Crop code	
39	beans, bush	43	corn, sweet	40	peas, English	35	squash
40	beans, lima	35	cucumber	39	peas, Southern	50	strawberry, mulched
40	beans, pole	31	eggplant	31	pepper	30	tomato, unmulched
33	cabbage, head	82	garden, general vegetables	38	potato, Irish	44	tomato, mulched
32	cantaloupe	53	okra	41	potato, sweet	82	vegetable garden
53	collard	33	onion	33	spinach	32	watermelon

FRUIT CROPS

Except for pH and lime requirement, and in some instances P, soil tests are generally not used as a basis for fertilization of perennial fruit and nut crops in Florida. Program fertilization is practiced, and plant tissue testing is helpful in certain crops. Tissue testing is available from commercial labs. Consult with your County Extension Agent about interpretation before taking samples.

Crop code	
60	citrus (establishment)
61	citrus (bearing trees)

ORNAMENTAL HORTICULTURE

Do not use this form for potting media used in containers. That material is tested by the "Greenhouse & Potting Media Test." Use form No. 2674.

Crop code	
71	athletic field, golf green, tee, or fairway
80	commercial woody ornamental nursery growing plants in the ground

Analysis Code	Analysis name	(determinations made)	Charge
1	Routine Soil Test	(pH, lime requirement, P, K, Ca, and Mg)	$3.00
2*	Soil pH and Lime Requirement	(pH and lime requirement)	$1.00
3	Micronutrients	(Cu, Mn, Zn and pH)	$2.00
4	Organic Matter	(percent organic matter)	$2.00
6	Soluble Salts	(1:2 soil:water)	$1.00

*Included in Routine Soil Test. Do not request both codes 1 and 2

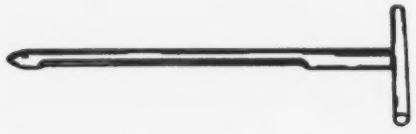
Complete the self-check questions beginning on the next page.

BEST COPY AVAILABLE

SELF-CHECK

Directions: Choose the best answer for each question below.

1. What is the name of the tool shown below?



   a. tube
   b. soil auger
   c. soil probe
   d. trowel

2. Which of the following is best for taking a sample in dry soil?

   a. soil auger
   b. trowel
   c. shovel
   d. soil probe

3. Which **three** of the following should be included on the label before the soil sample is sent to the lab?

   a. date
   b. location
   c. weather
   d. depth

4. When collecting a soil sample it is important to avoid

   a. heavily limed areas
   b. pastureland
   c. cropland
   d. broad flat areas

5. When collecting cores it is important to remember

   a. cropland should be sampled at a 3-inch depth
   b. to sample regularly every 6 feet in whole area
   c. to sample from 5-6 locations for each area
   d. to sample randomly avoiding unrepresentative areas

Continued on the next page.

6. What is the necessary depth of a soil sample for lawns or fairways?

   a. 1"
   b. 3"
   c. 8"
   d. 18"

7. You work for a local nursery. A good customer, Frank Smith, grows azaleas on an acre of land for a hobby. He told you that his plants were not doing well. Your boss asked you to help Frank by collecting a soil sample for pH analysis in his azalea field. Your boss then gave you a check for $1.00. You collected the sample and labeled it No. 6; it is now ready to take to the lab.

   Complete the soil test information sheet on the next page. Fill in Frank's name, the nursery's address and phone number (2214 North Monroe Street, Tallahassee, Florida 32303, 385-6202), and the name of the county (Leon). Enter the crop code according to the following chart:

Lawns	Crop Code	Home Grounds	Crop Code
bahiagrass lawn	72	azaleas, camellias, gardenias, hibiscus, or ixora	79
bermudagrass lawn	73	blueberries	67
carpetgrass lawn	74	dooryard citrus	61
centipedegrass lawn	75	trees (landscape)	81
ryegrass lawn	76	vegetable garden	82
St. Augustinegrass lawn	77	woody ornamentals in landscape	81
zoysiagrass lawn	78		

Home Lawn and Garden
SOIL TEST

SOIL SCIENCE DEPARTMENT

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611

Direct any questions regarding this test or the interpretation of the results to your county Extension agent.

Mailing Address (please print):

Name _____

Address _____

City _____ State _____ Zip _____

County _____ Date _____ Phone _____

This is the appropriate soil test for you if the following points describe your lawn and garden situation:

- You use complete fertilizer and do not intend to use single-element fertilizers.
- You want to know if your soil pH is appropriate for the plants you are growing.

Fill in all requested information, using one line per sample and additional sheets for more than 4 samples.

Lab Use Only	Soil Sample Number or Other Identification	Crop Code	Acreage or Square Feet	Charge ($1.00 per sample)
	(a)	(b)	(c)	(d)

Please enclose payment and this sheet in same package as sample (s).

(e) Cash ____ Check ____ M.O. ____ (f) Total Charge $ _____

NOTE ANY SPECIAL PROBLEMS FOR EXTENSION AGENT:

Check your answers with the correct ones provided on the following page.

55

ANSWER SHEET FOR SELF-CHECK_____

1. c
2. a
3. a, b, d
4. a
5. d
6. b
7.

Home Lawn and Garden SOIL TEST

SOIL SCIENCE DEPARTMENT

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611

Direct any questions regarding this test or the interpretation of the results to your county Extension agent.

Mailing Address (please print):

Name _____

Address _____

City _____ State _____ Zip _____

County _____ Date _____ Phone _____

This is the appropriate soil test for you if the following points describe your lawn and garden situation:

- You use complete fertilizer and do not intend to use single-element fertilizers.
- You want to know if your soil pH is appropriate for the plants you are growing.

Fill in all requested information, using one line per sample and additional sheets for more than 4 samples.

Lab Use Only	Soil Sample Number or Other Identification	Crop Code	Acreage or Square Feet	Charge ($1.00 per sample)
	(a) 6	(b) 79	(c) 1	(d) $1.00

Please enclose payment and this sheet in same package as sample (s).

(e) Cash ___ Check ✓ M.O. ___ (f) Total Charge $ $1.00

NOTE ANY SPECIAL PROBLEMS FOR EXTENSION AGENT:

All of your answers should agree with the answers on this Answer Sheet. If you missed any, go back and repeat one or more of the Learning Activities. If you answered everything correctly, go on to the Activity Sheet.

ACTIVITY SHEET_____

Directions: Tell your instructor that you are ready to collect soil samples for practice. Your instructor and you should make arrangements for this activity. Collect soil sample for laboratory test and evaluate your work using the following checklist.

Tasks	Yes	No
1. Gathered tools and equipment?		
2. Marked the area from which soil sample is to be collected on a map or grid to determine where and how many samples are required?		
3. Scraped off top debris or residue and removed foreign materials from soil surface?		
4. Collected representative samples from the recommended depth, using paper bags or other suitable containers?		
5. Collected soil from all appropriate areas of field?		
6. Broke up clods or lumps and spread out and dried the samples at room temperature?		
7. Mixed and placed the sample in a suitable container?		
8. Numbered and labeled each sample including date, depth, and field location for a laboratory test?		
9. Completed the soil test information sheet?		
10. Cleaned and stored all tools and equipment?		

All items must be marked "Yes" for attainment of this objective. If you have any questions, consult with the instructor. If you feel confident that you have mastered this objective, tell your instructor that you are ready to take the written test.

WRITTEN TEST_____

Student's Name _____

Directions: Circle the best answer below.

1. What is the name of the tool used to extract a core for a wet soil sample?

   a. tube
   b. soil probe
   c. soil auger
   d. soil spade

2. Which set of tools is best for taking cores of equal depth?

   a. soil spade and shovel
   b. soil auger and soil probe
   c. soil probe and spade
   d. soil shovel and soil spade

3. How deep should the soil be taken for sampling soil in cropland?

   a. 3 inches
   b. plow depth
   c. 18 inches
   d. any depth less than 12"

4. Sample cores should be taken

   a. regularly every 6-8 feet in the area
   b. near limed areas
   c. randomly in representative areas
   d. 30 times.

5. After drying the soil, which of the following is the next step in the process of obtaining a soil sample?

   a. take the sample to the county extension office
   b. gather at least 15-30 cores
   c. scoop out one pint of soil as final sample
   d. mix the cores and crush coarse granules

6. Which of the following elements should be on the label for soil samples?

   a. color, type of rocks, date
   b. depth of sample, location, date
   c. color of soil, location, amount of soil
   d. type of soil, date, location

Continued on the next page.

7. You have twenty plowed acres where you want to plant sweet corn. It is your only crop. You want to know if the soil conditions are favorable for a high yield, or, if not, what additions (fertilizer, lime) are recommended. You plan to sell the corn at market, so the best produce you can grow is important. You have just taken a soil sample (No. 5) and are ready to complete the soil test information sheet for a routine soil test. You will pay by check.

   Complete the soil test information sheet on the next page. Use the crop code chart and the analysis chart below.

VEGETABLE CROPS

NOTES: 1. Please use Code 82 for gardens where more than one kind of vegetable is grown. Codes for particular vegetables will result in fertilizer recommendations for commercial vegetable production which are not appropriate for home vegetable gardens.
2. "Mulched" refers to situations where the crop is grown under plastic or similar impermeable mulch.

Crop code		Crop code		Crop code		Crop code	
39	beans, bush	43	corn, sweet	40	peas, English	35	squash
40	beans, lima	35	cucumber	39	peas, Southern	50	strawberry, mulched
40	beans, pole	31	eggplant	31	pepper	30	tomato, unmulched
33	cabbage, head	82	garden, general vegetables	38	potato, Irish	44	tomato, mulched
32	cantaloupe	53	okra	41	potato, sweet	82	vegetable garden
53	collard	33	onion	33	spinach	32	watermelon

FRUIT CROPS

Except for pH and lime requirement, and in some instances P, soil tests are generally not used as a basis for fertilization of perennial fruit and nut crops in Florida. Program fertilization is practiced, and plant tissue testing is helpful in certain crops. Tissue testing is available from commercial labs. Consult with your County Extension Agent about interpretation before taking samples.

Crop code	
60	citrus (establishment)
61	citrus (bearing trees)

ORNAMENTAL HORTICULTURE

Do not use this form for potting media used in containers. That material is tested by the "Greenhouse & Potting Media Test." Use form No. 2674.

Crop code	
71	athletic field, golf green, tee, or fairway
80	commercial woody ornamental nursery growing plants in the ground

Analysis Code	Analysis name	(determinations made)	Charge
1	Routine Soil Test	(pH, lime requirement, P, K, Ca, and Mg)	$3.00
2*	Soil pH and Lime Requirement	(pH and lime requirement)	$1.00
3	Micronutrients	(Cu, Mn, Zn and pH)	$2.00
4	Organic Matter	(percent organic matter)	$2.00
6	Soluble Salts	(1:2 soil:water)	$1.00

*Included in Routine Soil Test. Do not request both codes 1 and 2

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Continued on the next page.

Producer Soil Test Information Sheet

SOIL SCIENCE DEPARTMENT

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611
Phone 904-392-1950

mailing address (please print):

name_____

address_____

city_____ state_____ zip_____

phone_____ county_____ date_____

Fill in all requested information, using one line per sample and additional sheets for more than 10 samples.

lab use only	soil sample identification	crop (s) code (s)	acreage or square feet	analyses requested	charges
	(a)	(b)	(c)	(d)	(e)

SPECIAL PROBLEMS:

(f) cash___ check___ m.o.___ (g) total $ _____

Please enclose payment and this sheet in same package as sample (s).

bill to:_____

account number _____

After successfully completing this written test, tell your instructor that you are ready to take the performance test.

WRITTEN TEST ANSWER KEY

1. a
2. b
3. b
4. c
5. d
6. b
7.

Producer Soil Test Information Sheet

SOIL SCIENCE DEPARTMENT

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Institute of Food and Agricultural Sciences
Gainesville, FL 32611
Phone 904-392-1950

mailing address (please print):

name_____

address_____

city_____ state_____ zip_____

phone_____ county_____ date_____

Fill in all requested information, using one line per sample and additional sheets for more than 10 samples.

lab use only	soil sample identification	crop (s) code (s)	acreage or square feet	analyses requested	charges
	(a) 5	(b) 43	(c) 20	(d) 1	(e) $3.00

SPECIAL PROBLEMS:

(f) cash___ check ✓ m.o.___ (g) total $ $3.00

Please enclose payment and this sheet in same package as sample (s).

bill to:_____

account number_____

PERFORMANCE TEST _____

Performance Checklist

Directions for the Evaluator/Instructor: Provide the student with the necessary tools and equipment. Have the student take a representative soil sample and prepare the soil for laboratory testing. Evaluate the student's performance using this checklist. All tasks must be evaluated as satisfactory for successful achievement of this performance objective.

Student's Name: _____

Evaluator: _____ Date: _____

Tasks	Evaluator's Ratings	
	Satisfactory	Not Satisfactory
1.0 Prepared the soil surface for the sample collection by		
1.1 gathering the necessary tools and equipment	_____	_____
1.2 choosing locations representative of the whole area	_____	_____
1.3 completing a map of area from which soil cores are to be collected	_____	_____
1.4 scraping off top debris or residue	_____	_____
1.5 removing foreign materials from the soil surface.	_____	_____
2.0 Collected the soil sample by		
2.1 collecting a representative sample from the recommended depth	_____	_____
2.2 collecting an appropriate number of samples for a particular area (20-30 for limed soil)	_____	_____
2.3 taking equal amounts of soil from each location.	_____	_____
3.0 Prepared the soil sample for the laboratory by		
3.1 breaking up lumps, spreading the soil out, and drying it at room temperature	_____	_____
3.2 reducing coarse granules to wheat grain size or smaller	_____	_____
3.3 mixing soil cores in the clean container	_____	_____
3.4 placing the sample in an appropriate container	_____	_____

3.5 numbering and labeling the sample container with the date, depth, and location. _____ _____

4.0 Completed the task by

4.1 completing the soil test information sheet _____ _____

4.2 cleaning and storing all tools and equipment. _____ _____

Comments: _____

_____

Producer Soil Test Information Sheet

SOIL SCIENCE DEPARTMENT

EXTENSION SOIL TESTING LABORATORY
Wallace Building, No. 631
University of Florida
Institute of Food and Agricultural Sciences
Gainesville, FL 32611
Phone 904-392-1950

mailing address (please print):

name _____

address _____

city _____ state _____ zip _____

phone _____ county _____ date _____

Fill in all requested information, using one line per sample and additional sheets for more than 10 samples.

lab use only	soil sample identification	crop (s) code (s)	acreage or square feet	analyses requested	charges

SPECIAL PROBLEMS:

cash___check___m.o.___ total $ _____

Please enclose payment and this sheet in same package as sample (s).

bill to: _____

account number _____

END OF SAMPLE STUDENT LEARNING GUIDE

State of Florida
Department of Education
Tallahassee, Florida
Betty Castor, Commissioner
Affirmative action/equal opportunity employer

Division of Vocational, Adult, and Community Education

DVACE/04/89/450 123456789/89 AG 400 BK 89

CAREER MERIT ACHIEVEMENT PLAN (CAREER MAP)

NURSERY OPERATIONS

(0101.060600)

STUDENT'S NAME

State of Florida

An affirmative action/equal opportunity employer

DEPARTMENT OF EDUCATION
Betty Castor, Commissioner

DIVISION OF VOCATIONAL, ADULT, AND COMMUNITY EDUCATION
Robert S. Howell, Director

INDUSTRY-BASED PARTNERSHIP PROGRAMS: The State of Florida is committed to the development of industry-based partnership programs, designed by education and industry to respond to industry's demand for a highly skilled work force.

PRODUCED BY

The Center for Instructional Development and Services
College of Education
Florida State University

FOR FURTHER INFORMATION, CONTACT

Bureau of Vocational Program and Staff Development
Division of Vocational, Adult, and Community Education
Department of Education
Knott Building
Tallahassee, FL 32399
(904) 488-0484

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THIS MERIT ACHIEVEMENT PLAN RECORDS THE ACHIEVEMENTS OF:

Student's Name _____

Student's ID Number _____

Student's Address _____

_____

Instructor's Name _____ **Initials** _____

School _____

_____

Date Started _____

PRIMARY JOB TITLES FOR THIS INSTRUCTIONAL PROGRAM

- Field Horticultural-Specialty Grower (DOT #405.161-014)
- Inside Horticultural-Specialty Grower (DOT #405.161-018)
- Horticultural Worker II (DOT #405.687-014)

RELATED JOB TITLES

- Horticultural-Specialty Farming Supervisor (DOT #405.131-010)
- Field Inspector, Disease and Insect Control (DOT # 408.687-010)

ACKNOWLEDGMENTS

The following individuals are recognized for their valuable contributions to the identification and validation of the competencies reflected in this MAP:

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Richard Carroll, Carroll's Nursery, St. Petersburg
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OVERVIEW

This Career MAP includes the competencies required for entry into the field of nursery operations. Business and industry representatives have recommended that students in this field master these competencies in order to become employable. Local education agencies (LEAs) may adapt these competencies to meet their work-force needs.

Purposes of the MAP

The purposes of the MAP are to display the student performance standards (SPSs) required by the LEA and to document the level of achievement on SPSs that the student demonstrates.

How to Use the MAP

Administrator and Instructor. The administrator and instructor can use Career MAPs in curriculum planning, program updating and improvement, and teacher recruitment, selection, and updating. If the LEA changes or adds SPSs, the revised or additional SPSs should be included in the blank boxes that appear within each intended outcome or at the end of this MAP.

Instructor. The instructor can use Career MAPs to keep track of student progress on SPSs. By periodically reviewing the ratings on standards, the instructor can identify a student's strengths and weaknesses and on that basis identify the skills for which the student needs remedial instruction or advanced training. MAPs can also be useful in student counseling and evaluation.

Co-op Instructor/Employer. The employer who sponsors a co-op program should use the Career MAP for keeping a record of the student's performance on appropriate standards. The MAPs will also help the co-op instructor/employer in counseling and evaluating the student.

Student. The student may use the MAP to show potential employers the performance standards he or she has mastered. In order to present a complete record, the student should encourage the instructor/co-op employer to rate his or her level of achievement on all the appropriate SPSs and to fill in the verification form and the cooperative work experience page in the back of this MAP.

Employer. The MAP shows an employer the SPSs mastered by the student (a prospective employee) and the proficiency level achieved on each one. This information can help the employer make decisions about hiring, job assignments, and job-training needs.

Rating Student Performance

Performance Competencies. Ratings on SPSs should be based upon business/industrial performance standards. The evaluator observes and evaluates student performance as he or she would in the role of the employer or supervisor.

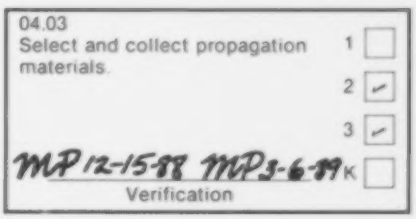
For each skill listed, the learner receives a rating of 1, 2, or 3. Each rating indicates a particular level of achievement:

1 = Learner demonstrates knowledge and understanding of this SPS but is not yet able to apply that knowledge or understanding.

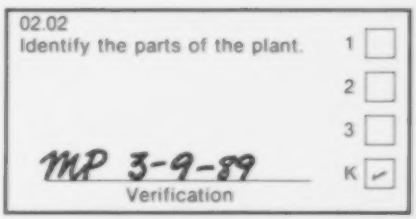
2 = Learner performs this SPS satisfactorily with only periodic supervision.

3 = Learner performs this SPS satisfactorily without supervision.

Whenever a performance standard is demonstrated, the instructor checks the appropriate rating box (1, 2, or 3) and initials and dates the verification line. If the student later demonstrates a higher level of achievement on a performance competency, the instructor checks the higher level and then enters his or her initials and the new date on the verification line, as shown in the following example:



Knowledge Competencies. For each SPS that is a knowledge competency only, with no manipulative skill involved, only one level of achievement is possible. If the student masters the competency, he or she receives a check in the bottom box ("K"), as shown below:



NOTE: An SPS without a checked rating indicates that the learner has not mastered the standard from lack of ability, time, opportunity, or need (the student's area of specialization may not have required it).

01.0 DEMONSTRATE AN UNDERSTANDING OF THE HORTICULTURE INDUSTRY.

01.01 Identify fields of endeavor. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.02 Describe the economic importance of the horticulture industry. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.03 Describe the environmental importance of the horticulture industry. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
01.04 Identify employment opportunities. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.05 Describe regulatory aspects. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.06 Identify continuing educational opportunities. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
01.07 Identify professional organizations and trade journals in the horticulture industry. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

02.0 DESCRIBE PLANT PHYSIOLOGY AND GROWTH.

02.01 Describe woody and herbaceous plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.02 Identify the parts of the plant. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.03 Describe the process of photosynthesis. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
02.04 Describe the basic functions of roots, stems, and leaves. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.05 List the requirements for healthy plant growth. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.06 Identify taproot and fibrous root systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

NURSERY OPERATIONS

02.07 Identify the difference between evergreen and deciduous plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

03.0 IDENTIFY AND CLASSIFY PLANTS.

03.01 Classify plants as monocots or dicots. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	03.02 Identify plants according to their scientific and common names. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	03.03 Classify plants as annuals, biennials, and perennials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
03.04 Identify the plants appropriate to a region. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	03.05 List the environmental preferences of plants (shade, sun, wind, moisture, salt, etc.). 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	03.06 Classify plants according to growth habit. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

04.0 PROPAGATE PLANTS.

04.01 Identify asexual and sexual plant-propagation methods. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	04.02 Prepare propagation media. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	04.03 Select and collect propagation materials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

04.04 Demonstrate propagation by seeding, grafting, budding, layering, separation, division, and cuttings. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	04.05 Demonstrate environmental controls for propagation materials (moisture, temperature, light). 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	04.06 Transplant rooted propagation materials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
04.07 Identify propagating and growing facilities and structures. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

05.0 IDENTIFY GROWING MEDIA AND APPLY FERTILIZERS.

05.01 Identify soil and media materials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.02 Identify the types and kinds of fertilizer. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.03 Identify methods of distributing fertilizers. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
05.04 Interpret the analysis of fertilizer from information on tag or container. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.05 Identify symptoms of nutritional deficiencies of plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.06 Collect a soil sample for soil analysis. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
05.07 Determine the fertilization requirements of plant materials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.08 Determine a fertilizer schedule. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.09 Apply fertilizer and soil amendments. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
05.10 Apply special fertilization methods appropriate to a region or plant group. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.11 Determine the rate of fertilizer applications. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.12 Recognize the symptoms of fertilizer burn. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

05.13 Clean and store the fertilizer-application unit. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	05.14 Maintain fertilization records. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

06.0 IRRIGATE PLANTS AND TURFS.

06.01 Identify the water needs of plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	06.02 Identify irrigation components and types of systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	06.03 Identify sources of water for irrigation. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
06.04 Install irrigation systems with control valves and clocks. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	06.05 Install a drainage system. Identify drainage components for different types of drainage systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	06.06 Irrigate plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
06.07 Repair irrigation systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

07.0 CONTROL PESTS.

07.01 Classify insects according to their feeding habits. 1 2 3 K _____ Verification	07.02 Identify common pests of plants (insects, diseases, weeds, nematodes). 1 2 3 K _____ Verification	07.03 Describe life cycles of common pests of plants. 1 2 3 K _____ Verification
07.04 Describe methods (biological, chemical, and cultural) of controlling plant pests. 1 2 3 K _____ Verification	07.05 Report pest damage. 1 2 3 K _____ Verification	07.06 Interpret the information on a pesticide or agricultural chemical label. 1 2 3 K _____ Verification
07.07 Interpret and use the spray-compatibility chart. 1 2 3 K _____ Verification	07.08 Comply with local, state, federal, and EPA regulations regarding pesticide use. 1 2 3 K _____ Verification	07.09 Select, mix, and apply pesticides according to the product label. 1 2 3 K _____ Verification
07.10 Clean, adjust, and calibrate spray equipment. 1 2 3 K _____ Verification	07.11 Store and dispose of pesticide containers legally. 1 2 3 K _____ Verification	07.12 Maintain pesticide records. 1 2 3 K _____ Verification
07.13 Describe symptoms of pesticide poisoning and identify the first aid required. 1 2 3 K _____ Verification	07.14 Determine the appropriate time to apply chemicals. 1 2 3 K _____ Verification	07.15 Select and identify pesticides according to the controlling action (stomach, contact, systemic) of each. 1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

NURSERY OPERATIONS

08.0 DEMONSTRATE PRUNING SKILLS.

08.01 Identify methods of pruning plants to achieve desired growth and maintain health. 1 2 3 K _____ Verification	08.02 Identify and select pruning tools for the task. 1 2 3 K _____ Verification	08.03 Identify the appropriate time to prune plants. 1 2 3 K _____ Verification
08.04 Root-prune appropriate plants. 1 2 3 K _____ Verification	08.05 Prune plants for desired shape and growth. 1 2 3 K _____ Verification	08.06 Identify and select chemical growth regulators. 1 2 3 K _____ Verification
08.07 Identify means of sterilizing pruning tools. 1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

09.0 HARVEST, TRANSPORT, AND INSTALL PLANT MATERIALS.

09.01 Select and prepare field-grown and container plants for transportation and transplanting. 1 2 3 K _____ Verification	09.02 Determine the requirements for preserving plant viability. 1 2 3 K _____ Verification	09.03 Install ornamental plants per a landscape plan. 1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

NURSERY OPERATIONS

10.0 OPERATE, REPAIR, AND MAINTAIN TOOLS AND EQUIPMENT.

10.01 Identify, operate, and maintain small gasoline engines. 1 2 3 K _____ Verification	10.02 Identify, operate, and maintain hand tools and power tools. 1 2 3 K _____ Verification	10.03 Perform a pre-operational check of equipment before use. 1 2 3 K _____ Verification
10.04 Identify, operate, and maintain a tractor and power equipment. 1 2 3 K _____ Verification	10.05 Load, secure, and transport equipment. 1 2 3 K _____ Verification	10.06 Demonstrate safety precautions while working with tools and equipment. 1 2 3 K _____ Verification
10.07 Maintain equipment-maintenance and service records. 1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

11.0 KEEP RECORDS.

11.01 Keep fertilizer- and pesticide-application records. 1 2 3 K _____ Verification	11.02 Keep equipment-maintenance and service records. 1 2 3 K _____ Verification	11.03 Keep job records, daily log sheets, and inventory. 1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

NURSERY OPERATIONS

12.0 DEMONSTRATE EMPLOYABILITY SKILLS.

12.01 Conduct a job search. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.02 Secure information about a job. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.03 Identify documents that may be required when applying for a job. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
12.04 Complete a job-application form correctly. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.05 Demonstrate competency in job-interview techniques. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.06 Identify or demonstrate appropriate responses to criticism from an employer, a supervisor, or other persons. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
12.07 Identify acceptable work habits. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.08 Demonstrate knowledge of how to make job changes appropriately. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	12.09 Demonstrate acceptable employee health habits. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

13.0 DEMONSTRATE LEADERSHIP, COMMUNICATIONS, AND HUMAN-RELATIONS SKILLS.

13.01 Develop citizenship awareness and responsibility. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	13.02 Describe the organization, operation, and purposes of student agricultural organizations. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	13.03 Organize and conduct meetings. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
13.04 Demonstrate effective written and oral communication skills. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	13.05 Demonstrate good interpersonal and human-relations skills. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

14.0 PREPARE GROWING MEDIA AND SEEDBEDS.

14.01 Mix rooting and growing media according to plan requirements. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	14.02 Sterilize rooting, potting, and growing media. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	14.03 Collect and test a soil sample from field and potting media. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
14.04 Adjust pH and nutritional levels of media. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	14.05 Prepare planting beds and sites. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	14.06 Fill and level benches and pots with media. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
14.07 Demonstrate sanitation practices when handling and storing plant media materials. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

15.0 PROPAGATE NURSERY STOCK.

15.01 Collect propagation materials (seeds, cuttings, scions, bulbs, etc.) at the proper time. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	15.02 Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	15.03 Prepare flats and a seedbed and then plant seeds. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

15.04 Prepare a rooting bed. 1 2 3 K _____ Verification	15.05 Prepare propagation materials (seeds, cuttings, scions, etc.) for planting. 1 2 3 K _____ Verification	15.06 Apply growth stimulants to propagation materials. 1 2 3 K _____ Verification
15.07 Control the propagation-facility environment (moisture, temperature, light). 1 2 3 K _____ Verification	15.08 Transplant rooted propagation materials, including tissue-culture transplants. 1 2 3 K _____ Verification	15.09 Demonstrate sanitation and safety practices when propagating. 1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

16.0 PRUNE AND SHAPE NURSERY STOCK.

16.01 Prune plants to achieve desired growth. 1 2 3 K _____ Verification	16.02 Select and use chemical growth regulators. 1 2 3 K _____ Verification	16.03 Root-prune nursery plants and trees. 1 2 3 K _____ Verification
16.04 Identify techniques for pruning specialty items (topiary, espalier, bonsai, etc.). 1 2 3 K _____ Verification	16.05 Prune plants at the appropriate time. 1 2 3 K _____ Verification	16.06 Demonstrate sanitation and safety practices when pruning. 1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification
1 2 3 K _____ Verification	1 2 3 K _____ Verification	1 2 3 K _____ Verification

17.0 IRRIGATE PLANTS.

17.01 Identify and use various types of irrigation components and systems. 1 2 3 K Verification	17.02 Set up an irrigation system for a propagation area. 1 2 3 K Verification	17.03 Set up an irrigation system for a greenhouse or enclosed structure. 1 2 3 K Verification
17.04 Set up an irrigation system for a shadehouse. 1 2 3 K Verification	17.05 Set up an irrigation system for a retail display area. 1 2 3 K Verification	17.06 Set up an irrigation system for a field growing area. 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

18.0 HARVEST, PROCESS, AND SHIP NURSERY STOCK.

18.01 Grade and harvest field-grown plants (ball, burlap, bare-root, "grow bags"). 1 2 3 K Verification	18.02 Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger). 1 2 3 K Verification	18.03 Select, grade, and assemble container-grown plants. 1 2 3 K Verification
18.04 Prepare for the shipment, loading, and transporting of harvested plant materials. 1 2 3 K Verification	18.05 Use proper methods for preserving plant viability. 1 2 3 K Verification	18.06 Comply with regulations regarding the inspection and movement of plant materials. 1 2 3 K Verification
18.07 Demonstrate safety practices when harvesting, processing, and shipping nursery stock. 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

19.0 MARKET NURSERY STOCK.

19.01 Label and merchandise plants. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	19.02 Maintain clean and attractive merchandising and display areas. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	19.03 Use various advertising methods to promote sales. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
19.04 Take telephone orders. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	19.05 Use sales catalog. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	19.06 Greet customers. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
19.07 Describe the care and use of plants to customers. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

20.0 OPERATE, REPAIR, AND MAINTAIN NURSERY EQUIPMENT AND FACILITIES.

20.01 Determine the equipment needs for the job. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	20.02 Clean, calibrate, and maintain chemical sprayers. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	20.03 Operate and service tractors, small gasoline engines, and power equipment. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

NURSERY OPERATIONS

20.04 Maintain electric motors and equipment. 1 2 3 K Verification	20.05 Order parts and supplies. 1 2 3 K Verification	20.06 Prepare and store equipment. 1 2 3 K Verification
20.07 Perform simple plumbing and electrical repairs. 1 2 3 K Verification	20.08 Build or repair frames, benches, and other greenhouse or nursery structures. 1 2 3 K Verification	20.09 Demonstrate safety practices when working with equipment and facilities. 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

21.0 FERTILIZE NURSERY STOCK.

21.01 Identify and evaluate the influences of nutrients on plant growth. 1 2 3 K Verification	21.02 Collect soil and leaf-tissue samples for analysis. 1 2 3 K Verification	21.03 Interpret and evaluate the results of soil and leaf-tissue analysis. 1 2 3 K Verification
21.04 Apply fertilizers using appropriate methods (dry, liquid, slow-release, injection, etc.). 1 2 3 K Verification	21.05 Demonstrate proper handling and storage of fertilizers, observing safety precautions. 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

22.0 CONTROL PLANT PESTS.

22.01
Identify plant-disease symptoms and causal agents.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.02
Identify insect and insect-like damage and causal agents.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.03
Identify noxious weeds.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.04
Select the proper controls (biological, chemical, and cultural) for insects, diseases, and weeds.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.05
Determine the appropriate time, frequency, method, and amounts for the application of controls.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.06
Apply controls safely.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.07
Identify pesticide, herbicide, and chemical spray damage.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.08
Comply with local, state, and federal pesticide regulations.
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.09
Identify vertebrate damage and causal agents.
1 ☐
2 ☐
3 ☐
K ☐
Verification

1 ☐
2 ☐
3 ☐
K ☐
Verification

1 ☐
2 ☐
3 ☐
K ☐
Verification

1 ☐
2 ☐
3 ☐
K ☐
Verification

23.0 MAINTAIN AND ANALYZE RECORDS.

23.01
Analyze and maintain production and sales records.
1 ☐
2 ☐
3 ☐
K ☐
Verification

23.02
Determine plant-production costs.
1 ☐
2 ☐
3 ☐
K ☐
Verification

23.03
Prepare a budget.
1 ☐
2 ☐
3 ☐
K ☐
Verification

23.04
Prepare and maintain financial records.
1 ☐
2 ☐
3 ☐
K ☐
Verification

23.05
Maintain a current plant inventory.
1 ☐
2 ☐
3 ☐
K ☐
Verification

23.06
Describe the use of a computer in a nursery operation.
1 ☐
2 ☐
3 ☐
K ☐
Verification

NURSERY OPERATIONS

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

COOPERATIVE WORK EXPERIENCE COMPETENCIES.

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

NURSERY OPERATIONS

VERIFICATION

Each instructor who rates this student on competencies in this MAP should fill in one of the boxes below.

Initials _____

Signature _____

Title _____

School Name _____

School Address _____

Initials _____

Signature _____

Title _____

School Name _____

School Address _____

Initials _____

Signature _____

Title _____

School Name _____

School Address _____

COOPERATIVE WORK EXPERIENCE

In addition to classroom training and laboratory performance identified on the Career MAP, this student has participated in cooperative work experience with employers, as shown below.

Dates

Employer

Employer's Address

Supervisor

Supervisor's Title

Dates

Employer

Employer's Address

Supervisor

Supervisor's Title

Dates

Employer

Employer's Address

Supervisor

Supervisor's Title

NOTES

This section of the MAP is provided for the instructor, employer, or student to list additional qualifying statements or other pertinent information. All comments should be initialed for verification.

This public document was promulgated at an annual cost of $000.00. or $00.00 per copy, to display the intended outcomes and student performance standards of a vocational program and to provide a document for teachers to record student levels of achievement.

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